

ELEMENTARY
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GEOGRAPHY

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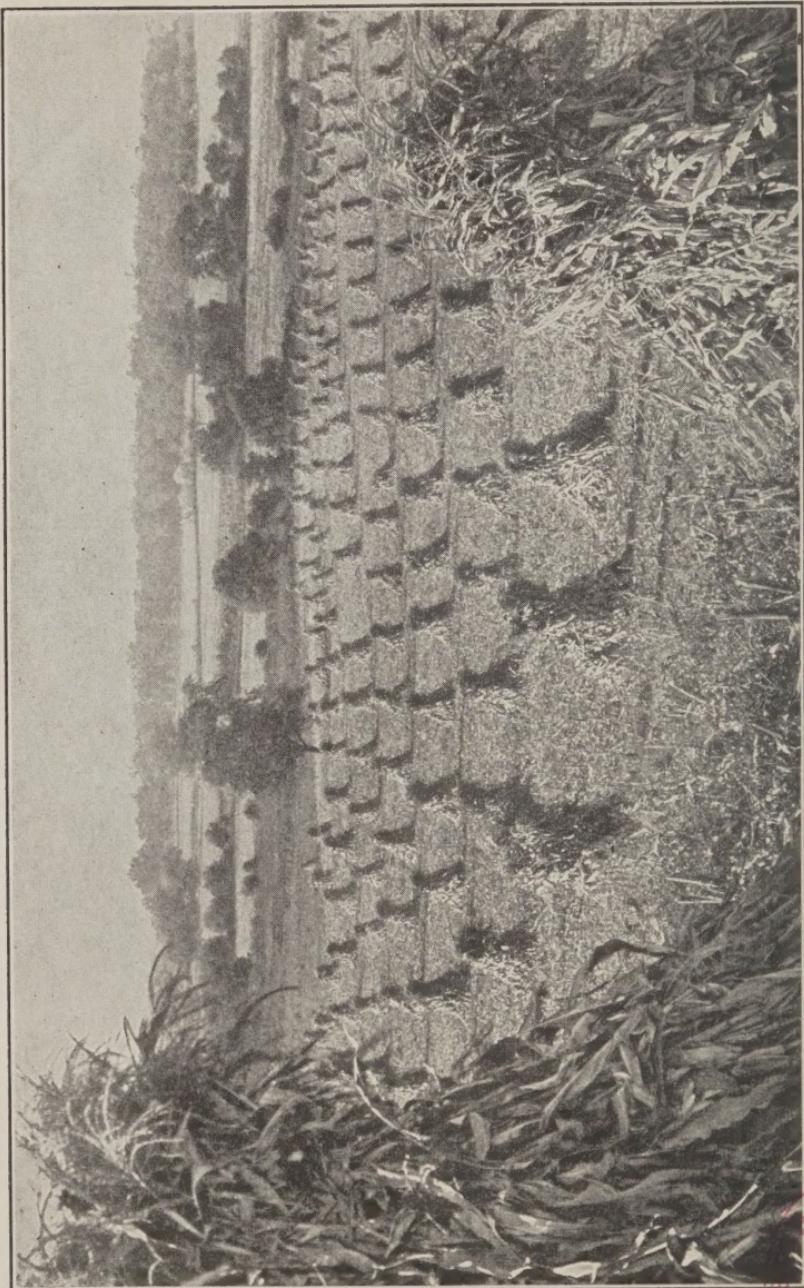
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FIG. I.—An Illinois Cornfield.



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ELEMENTARY ECONOMIC GEOGRAPHY

BY

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PREFACE

THERE is a growing demand from the schools for textbooks dealing with commerce and industry. The difficulties which lie in the way of presenting these subjects to immature pupils are many:

1. The facts to be presented are found largely in the form of tables of statistics which change from year to year. The meaning and trend of these changing figures must be seized and stated in the form of safe generalizations.

2. The facts and principles involved must be organized according to their physical relations, which are geographic, and their human relations, which are economic.

3. Clear and impressive pictures must be drawn of natural conditions and human occupations, as they exist in well-defined regions and among peoples of various degrees of culture.

4. The whole must be made sufficiently interesting to attract a large proportion of schoolboys and schoolgirls.

In this book the facts and principles of industry and commerce are organized upon a geographic basis. The limits implied in the term *commercial geography* are expanded into the broader and more significant conception of *economic geography*, or *a study of the ways in which different peoples in different regions get a living*.

Part I, *Human Economies and their Natural Foundations*, forms a general introduction to a science which takes a point of view not yet familiar to the student. The meaning of economy and economic geography is illustrated by detailed stories about seven of the simpler peoples, whose natural environments differ as widely as possible. A plan is then outlined by which the

pupil may undertake a study of the economic geography of his own community. While material for this is being collected outside the textbook, and largely outside the schoolroom, the natural foundations upon which all human economies are based and the general principles of economic geography may be learned from the text.

An attempt to cover the whole world in an elementary book would result in a treatment meager, scrappy, and confusing. Therefore Part II is confined to the *Economic Geography of the United States*. In area, in extent and variety of resources, and in complexity of economic conditions, this country is equivalent to the whole of Europe. To treat it as one economic unit would seem almost as objectionable as to treat Europe as a unit. The United States is, therefore, divided into five natural economic regions, or groups of states, each having a marked individuality of its own, which can be compared and contrasted with the others. Frequent comparisons with other leading countries are used to give an outline of the economic geography of the world.

Special pains have been taken to make the book sufficiently elementary for Grades 7 to 9, to make it as interesting as the subject matter permits, and to present a series of graphic pictures of economic life in many phases. With few exceptions, the latest authentic data have been used and arranged in tables convenient for comparison. The aim has been to make the burden of statistics as light as possible and to show the pupil what statistics mean. To this end the statements in the text are usually given in round numbers or in percentages of some standard quantity. Distributions are shown by numerous maps and graphs. Cities, regarded as the final and characteristic product of modern economic forces acting under geographic influences, are treated with unusual fullness. More than 100 pictures have been carefully selected to illustrate the text. It is hoped that this book, while meeting the usual demands for a commercial geography, may prove nothing less than geographical and something more than commercial.

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PART I

HUMAN ECONOMIES AND THEIR NATURAL FOUNDATIONS

CHAPTER I

INTRODUCTION. ECONOMY

Housekeeping. — Probably every family of your acquaintance, including your own, does some kind of work for a living. Out of the 20,000,000 families in the United States, very few are rich enough to live in idleness. A group of persons, mostly related by birth, who occupy the same house or home at least to eat and sleep in, form a family or household. Different members contribute in different ways, by service or money earned outside, to the support of the family. The welfare of these people depends largely upon the amount earned, the way in which the income is spent, the kind of service rendered and the general management of the household. The ancient Greeks called housekeeping *oeconomia*, meaning household management, a word which appears in the English *economy*, *economic*, *economical*.

All the people in a community, city, state, or country work together on a large scale and in a complex way to maintain and increase their common wealth and prosperity. In that sense they may be regarded as forming one household practicing the same economy. The whole human species may be thought of as one great family occupying the earth as a home. This conception may be enlarged to include our brethren, the animals and plants, for they share with us the opportunities of getting a living, and our welfare is bound up with theirs. Thus there comes to be plant economy, animal economy, family economy,

civic economy, national economy, and perhaps world economy, all closely related and worth studying together. *Economy in its broadest sense has come to mean the way in which living creatures get a living.* It is the "bread and butter" side of life.

Environment. — A stalk of corn or an oak tree must depend for its living upon the resources and conditions around it. If the soil is rich and is kept moist by frequent rains, if the air is warm and the sun shines through a sufficiently long season, the plant will grow, flourish, and produce fruit and seed. Deer can live and multiply only where they find grass and water the year around and where there are not too many enemies to kill them off. Lions can live only where deer and other defenseless animals are numerous enough to supply them with food.

So men must depend upon the natural resources around them for materials from which to make a living. The coal miner works only where there is coal, the lumberman in the forest, the fisherman along the coast. The farmer must adapt his crops to the soil and climate of *his* farm, the merchant his goods to the wants of *his* community, the manufacturer his products to the demands of *his* market. Men may reach out over a large territory and make use of things brought from the ends of the earth, but *they must produce something at home with which to buy the foreign goods.* The relief of the land around a man's home and its position in relation to rivers and the sea determine to what extent he can procure foreign goods and what they will cost. The climate and the materials available determine the kind and style of clothing he wears and the houses he builds. The work men do and the lives they lead are strongly influenced by the environment in which they live, *each man's environment being that part of the face of the earth with which he is closely related.*

Geography. — Geography is still what it has always claimed to be, a description of the earth. But the geographers of to-day are not satisfied with knowing simply where mountains, rivers,

forests, deserts, peoples, and cities are ; they want to know how they have come to be where and what they are, and *why those of one region are so different from those of another.*

Few plants, animals, or men can live in the polar regions on account of cold and darkness, and few in the desert on account of lack of water. Dense forests flourish near the equator because of continuous heat and moisture, but men are more numerous and highly civilized in temperate grasslands than in deserts or equatorial forests. Plants, animals, and men differ in different parts of the world largely because of their different environments. Modern geography undertakes to make a scientific study of all sorts of environments and to learn how plants, animals, and men are influenced by them and adapted to live in them.

Economic geography is a study of the different kinds of environments as they affect the different ways in which men get a living, and deals with natural resources, industries, and the distribution of useful products.

Natural Resources. — A natural resource is anything provided by nature which men can use to satisfy their wants. It may be (1) mineral, like soil, coal, and iron from the earth crust, salt from the sea, or nitrogen from the air ; (2) vegetable, like wood and wheat ; (3) animal, like meat and wool ; or (4) energy, like sunshine and water power. Some resources can be used directly in their natural state, as fruits and water for food ; but in most cases men must expend labor, not only in procuring them, but in making them more fit for use by some process of manufacture.

In other words, *men must work for a living.* Timber must be felled and cut into useful shapes, iron must be extracted from the ore and made into tools and machines, wheat must be ground into flour and baked into bread, wool must be sheared, spun, and woven into cloth, and water power must be harnessed to drive machinery and furnish heat and light. Civilized men use very few things which are not changed and made more valuable in some way by human labor.

All but the most primitive and uncivilized men satisfy some

of their wants by trade or the exchange of products with their neighbors. This makes it necessary to carry or transport goods from one place to another. The degree of civilization of any people may be measured by the quantity and value of the goods which they obtain by trade and transportation.

That part of economic geography which deals with the *work* involved in obtaining and manufacturing useful products is called *industrial geography*.

That part of economic geography which deals with the transportation and exchange of goods is called *commercial geography*.

The problem of economic geography may be stated in a sort of mathematical formula, thus:

$$\begin{array}{rcl} \text{Home} & = & \text{Work} & = & \text{People} \\ \text{or Environment} & = & \text{Industries} & = & \text{Human Life} \end{array}$$

The sign = means here, not *equals*, but *influences* or *controls*.

QUESTIONS

1. What other meaning than "household management" has the word "economy"?
2. What is the difference between a man's environment and his home?
3. How can the study of economic geography help people to get a better living?
4. Which is the larger subject, economic geography or commercial geography?
5. If you were planning to migrate to some other farm, town, or country, what would you want to know about the environment before you moved?

CHAPTER II

ECONOMIC RELATIONS

If any of us were turned out to shift for ourselves in an uninhabited country like the northeastern part of the United States, we might quiet the first pangs of hunger by eating clay, as some people do, but we could not live long on that. We might find grass, wild carrots, huckleberries, strawberries, blackberries, and beech, hickory, walnut, and chestnut trees growing on the clay soil, and they would supply roots, fruit, and nuts which would keep us from starvation. We might find rabbits, muskrats, squirrels, deer, and buffaloes plentiful, because they can multiply and grow fat on grass, nuts, and roots. If we could catch and kill them, raw or roasted rabbit, venison, or buffalo beef would be welcome additions to our dinner. Our diet might be varied by the flesh and eggs of wild turkeys and other birds which feed upon seeds, insects, and worms, by mussels and fish from the streams, and by bread made from wild rice and pond lily heads growing in the marshes (Fig. 2). Even the luxury of honey might be provided by wild bees, or sugar might be obtained from maple sap.

Daubing our bodies with mud would furnish some protection from heat, cold, and mosquitoes, but better clothing could be made from grass, leaves, and bark, and best of all from the skins of muskrats, rabbits, and deer, or of foxes and wolves which might prey upon them. Shelter from storms, protection from wolves and bears, and a hiding place to sleep in might be found in a thicket, in a hollow tree, under a cliff, in a rocky cavern, or in a hole dug out of a bank. A hut built of sticks, bark, or rushes, or a tent of skins would be generally more comfortable.

In this simple life we could use sharp sticks for spears, sharp stones for knives and axes, bone fishhooks and bark lines and nets, or even invent bows and arrows with flint heads. In the course of time we might become expert runners, archers, and

hunters; but, however ingenious we might be in making use of the resources of the country, *we could not live at all without the help of plants and animals, and the animals all depend upon the plants.* Plants need only earth, water, air, and sunshine to cover the ground with a carpet, which may grow into a forest hundreds of feet high. Roots, stems, leaves fruits, and seeds, all furnish food



FIG. 2.—Wild rice and pond lilies.

for many species of animals, and these in turn are preyed upon by other animals. Men draw upon all these sources to supply their innumerable wants, and so human life and welfare are bound up with the lives and welfare of all other creatures. Life, everywhere and always, means *living together*, and it often makes strange bedfellows.

This imaginary picture is not unlike the life of the North

American Indians before white men discovered the country. Many similar instances of actual human life may be found in various parts of the world, differing in details according to the environment, but all illustrating the same *economic relations*.

The Yahgans or Channel Indians.—The southern end of South America looks on the map as if it had been broken into a thousand pieces. It is a tangled chain of islands, peninsulas, capes, and promontories, separated by a maze of channels, inlets, bays, and coves. The rugged ridges and spurs of a mountain range rise steeply from the water's edge. Stormy west winds from the Pacific bring almost constant clouds, which drench the slopes with rain. It is never warm or very cold, although snow falls even in midsummer. There is an alternation of summer and winter every week. The land is covered with a forest so dense that few animals can penetrate or live in it. The native people are Indians who live along the shore, more on water than on land. They move about from cove to cove in canoes made of slabs of bark sewed together with sinew and braced with ribs. These canoes are about 25 feet long and four feet wide, with sharp ends, and are models for speed, safety, and capacity.

The principal food of these people consists of limpets, soft shell-fish which cling to rocks along the shore, and which at low tide are pried off by the women with sharp sticks. These are eaten raw or slightly roasted over a fire kept burning on sods in the bottom of the canoe. The Indians strike fire with a piece of iron ore and catch the sparks in birds' down. Fish are plentiful and are caught with a seaweed line without a hook. The people eat berries, and a sweet, mucilaginous fungus growing in the damp woods takes the place of bread. They let themselves down by a seaweed rope to gather birds' eggs on the face of the cliffs. They kill seals and sea otters with bone-headed harpoons, or with bows and arrows, and throw round stones with a rawhide sling. Their most ingenious tool is an ax made from a five-inch clam-

shell lashed to a stone for weight. The edge is keen but frail and requires a quick and delicate hand. With light and rapid strokes they can fell a tree or shape a paddle.



FIG. 3.—Yahgan Indians, with canoe and shelters.

The Yahgans cover their bodies with grease, and in very stormy weather hang a sealskin over their shoulders (Fig. 3). Their huts consist of a few poles covered on the weather side with boughs and grass, and left wide open toward the fire. A little dry grass serves for a seat or a bed. Almost unclothed and shelterless in a land of fierce and freezing storms, they never freeze or shiver. With passing ships they exchange seal and other skins for glass beads, which they prefer to knives and hatchets.

The land furnishes them a resting place, shelter, and materials for canoes and weapons. The sea furnishes abundant animal

food, which they secure without great exertion. They are as closely dependent upon the land and water, trees, and shellfish as the limpets are upon the water and rocks. In their circumstances and with their materials, they are almost perfectly adapted to their environment. They are bright, quick-witted, and contented with an apparently miserable, but not laborious existence in one of the most uninviting regions of the world. They have responded successfully to the few demands of their simple life.

The Eskimos. — The Arctic lands of North America comprise an archipelago of large islands, of which Greenland is the largest, and a wide tract of "barren grounds" bordering upon Hudson Bay and the ocean. The climate is severe, with a dark, stormy winter of eight or ten months and a cold, foggy summer of two to four months. The winter temperatures fall to -70° , and the summer temperatures cannot rise much above freezing on account of the fields of ice and snow. Greenland is a high plateau almost buried under an ice sheet thousands of feet thick. Most of the other lands are low and free from snow in summer. The straits, bays, sounds, and fiords are covered in winter with floe (sea) ice many feet thick which is broken and drifted about by tides, winds, and currents. The ice sheets and streams of the highlands discharge into the sea immense bergs, which choke the inlets and passages at all seasons. The bare and marshy grounds produce coarse grass, lichens, mosses, and stunted shrubs sufficient, even in Greenland, to support hares, musk oxen, and caribou. Millions of sea birds rest upon the shores, coming and going with the season. In the water and on the ice, seals, walruses, and polar bears find subsistence by catching fish.

This region has been occupied for centuries by Eskimos, who move about a good deal but do not venture far from the sea upon which they chiefly depend. To them the seal is the most valuable resource. Seals are hunted on the ice and with a *kayak*, or sealskin boat, which will not sink when upset. Seal

flesh is the Eskimos' principal food, seal blubber almost their only fuel, and from sealskin their clothing, boats, and tents are made. A log of driftwood from the continent is a prize, and metals are obtained only from white traders. Walrus and bear skins serve for rugs and beds. Sledges of wood and bone tied together with thongs are drawn by dog teams which travel sometimes seventy miles a day. Dogs are also used in hunting the polar bear. They are strong, hardy, impervious to cold, and can live upon one frozen fish a day.

In regions farther from the coast there is greater dependence upon land supplies. The caribou takes the economic place of the seal, and the bow is used instead of the harpoon. In early spring the caribou migrate in herds across the ice from the mainland to the islands, get fat, and return with calves in the autumn. While on the march they are slaughtered in great numbers, and their flesh is dried, or smoked, or cut up and mixed with fat to make pemmican for winter use. Their hides are cured for clothing, tents, and rope, and from their bones and horns, spearheads, fishhooks, chisels, and scrapers are made. Whitefish and salmon are caught in the streams by the women, children, and old men.

In winter, huts (Fig. 4) are made of blocks of snow laid in the form of a circular dome, which soon becomes frost and bear proof. They are heated by stone lamps burning seal oil and become so warm that the occupants strip off their garments. Huts of driftwood, stones, and dirt, and in summer skin tents are used. Such small game as hares, birds, and fish is not despised, but famine or plenty comes according to the catch of seals or caribou. The feast which follows a successful hunt is shared by all the neighbors. Some trade is carried on with white people, sealskins, walrus ivory, whalebone, and eider down being exchanged for knives, needles, and even firearms. The men fish, hunt, drive dogs, build huts, and make harpoons. The women cut and cook the game, dress and prepare skins, make clothing, kayaks, and large open boats, and care for the children.

The Eskimos are sea people, but get more from the land than

the Yahgans do. The severe climate and the poverty of the environment make the conditions of life so hard that it can be maintained only by constant effort. From necessity the Eskimos



FIG. 4.—Eskimos building a snow hut.

have become expert in making and handling a kayak, in harpooning seals, in hunting caribou and bears, in snow-house building, and in driving dog teams. In variety and ingenuity of implements and weapons they stand supreme among hunting peoples. They have domesticated and trained the dog to be an efficient helper, and have adopted a division of labor between men and women. They have no government and need none, but their varied industries and their superior skill and intelligence place them far above the Yahgans, whose simple life demands so little.

The South Sea Islanders.—Tahiti, a large island of the Society group, in the middle of the south Pacific Ocean, consists of a mountainous mass of old lava about thirty miles in diameter. Its jagged peaks rise 7000 feet above the sea and their slopes

are scarred with deep ravines. The streams have carried sediment to the sea and girdled the island all around with a flat, alluvial plain about a mile wide. When Captain Cook visited the island in 1769, he found the coast plain densely populated by tall, brown, handsome people, living in a forest of breadfruit, coconut, and other trees which sprang from the rich volcanic soil. Each house stood by itself in a clearing just large enough for it, and consisted of a thatched roof, supported on rows of posts and without walls. The floor covered with soft hay and mats was used only for sleeping.

There was food in profusion and variety to be had for the gathering. Plantations of breadfruit trees yielded fruit something like a loaf of bread, rather flavorless but nutritious, nine or ten months in the year. "If a man in the course of his life planted ten such trees, which might take the labor of an hour, he would as completely fulfill his duty to his own and future generations as we, natives of less temperate climate, can do by toiling in the cold of winter to sow and in the heat of summer to reap." Coconuts, thirteen varieties of bananas, plantains, sweet potatoes, yams, taro, and many other kinds of roots and fruits grew everywhere.

In the sea were fish, lobsters, and crabs in vast variety. The only useful land animals were pigs, fowls, and dogs, the flesh of dogs fed on vegetables being equal to English lamb. The natives had no vessel for boiling and "no more idea that water could be made hot than that it could be made solid." For cooking, wood mixed with stones was burned in a hole in the ground. The food wrapped in leaves was laid on the hot stones and covered with stones, leaves, ashes, and dirt in a primitive but perfect fireless cooker. Breadfruit thus baked resembles a boiled potato. Beaten up with coconut milk it forms a delicious custard. Meals were eaten out of doors with leaves for tablecloth and coconut shells, split bamboo knives, and the eater's own teeth and nails for utensils. The first course was raw fish followed by many dishes of starchy food, of which a man would eat an incredible quantity. Sea water was used for seasoning, up to a half pint at a meal. The natives drank coconut milk and ate raw sugar cane but had no alcoholic liquor or narcotic.

Cloth was made from the inner bark of trees, one of which, the paper mulberry, was planted. The bark was soaked in water, beaten with sticks, and pasted together in strips of any desired dimensions. This was dyed red or yellow and wrapped around the body, making a garment softer and cooler than fine cotton. Matting, baskets, hats, thread, lines, and nets were made of bark. Clubs of hard wood, spears twenty feet long, slings,



FIG. 5.—Tahitian war canoes.

stone axes, files made of coral stems, and chisels of human bone were used.

Their greatest mechanical achievement was the making of boats from logs hollowed out and built up with planks sewed on with coconut fiber. These boats were from ten to seventy feet long, but only two or three feet wide (Fig. 5). Two were fastened together side by side with cross poles, and fitted with deck, cabin, and standards. "To build a canoe with their tools was as great a work as to build a British man-of-war with ours." When gold, silver, and copper coins and iron nails were

laid down for them to choose from, the nails were always taken first.

The Tahitians were very clean, courteous, and affable, but great thieves. Their daily bread was always sufficient for the day, and they had but little need to provide for the future. In their environment the tropical profusion of resources for the support of human life relieved them of incentive to exertion, and they were in no way superior to the Eskimos. For their best development men require some hardship, but not too much. Life in Tahiti is as much too easy as in Greenland it is too hard.

The Pueblo Indians. — On the dry plateaus between the Colorado River and the Rio Grande, the Spanish explorers found, 400 years ago, people living in isolated villages, and called them *Pueblo* or village Indians. About 12,000 of them still live in northern New Mexico and Arizona in much the same way as their ancestors did. The region is a plateau 4000 to 7000 feet above the sea, diversified by mountain ranges, old volcanoes, flat-topped table-lands (mesas), cliffs, canyons, open sandy valleys, and dry watercourses. The air is dry and the skies are generally clear, permitting rapid radiation of heat to and from the ground. The cold winters bring drifting snow, and the hot summers bring violent thunderstorms on the mountains and sand storms over the lowlands. Winds are violent and "everything not nailed down blows away." After rains the streams are torrents for a few hours but soon disappear in the valley sands, leaving a belt of moist earth along the lower course and a few pools in the upper. The country is saved from being an absolute desert by the fact that scanty rainfall occurs twice a year. The melting snows of spring and the showers of midsummer are sufficient to start a quick growth of vegetation which makes the desert blossom as the rose. Buds, leaves, flowers, fruit, and ripe seeds follow one another in the space of a few weeks.

On three isolated projections of the plateau, seven to ten miles apart, stand seven villages of the Hopi or "peaceful

people." They crown the summits of the cliffs from which they are hardly distinguishable in form and color, and can be reached



FIG. 6.—A part of the pueblo of Acoma, N. M. There was once a village on top of the mesa in the background. (See Fig. 172.)

only by a difficult path or rough stairway. A pueblo (Fig. 6) consists of a single communal dwelling of many rooms, built in terraced stories, the upper being reached from the roof of the lower. There are few openings except in the flat roof, and the apartments are reached by climbing up and down ladders. The material is stone plastered with adobe; wooden beams are used to support the roof. Both site and structure are admirably suited for defense.

Game is scarce and fodder dear, therefore the Hopi are not hunters and make little use of meat. Their chief dependence is a variety of corn (Fig. 7) having deep roots and short stalks, grown wherever the intermittent streams bring sufficient moisture. The cultivated area is enlarged by irrigation canals, formerly more extensive than at present. To avoid a possible famine in

a dry year, a reserve of corn is kept in storage. They also raise beans, melons, squashes, peppers, and cotton, and have recently acquired from the Department of Agriculture wheat, peaches, apricots, and other grains, fruits, and vegetables. They keep sheep for wool, goats for milk, donkeys for transportation, and fowls for feathers and food, but the part played by animals in Hopi economy is small.



FIG. 7.—Bringing home the corn from the field.
Pueblo Indian, Arizona.

Clothing is made of cotton cloth, originally of their own weave, but now partly of commercial calico. The men wear shirts, trousers, and stockings, the women a belted robe like a blanket. Buckskin leggings and moccasins are worn for protection

from the thorny vegetation. The children wear no clothing. Since the introduction of sheep by the Spaniards, wool is also used. Blankets are made from rabbit skins, and ornamental work of woven feathers is skillfully done. The domestic water supply must be brought from the valleys, and the women climb the steep trails with full jars on their heads. The need for water storage made the Pueblo people skillful in the art of pottery from remote times. In texture, form, and artistic decoration their earthenware, made by the women entirely by hand, is superior to all other Indian products. In prehistoric times they had no metals and used obsidian (volcanic glass) for cutting implements. The men are now expert copper- and silversmiths, making rings and bracelets from Mexican dollars. Baskets are woven of yucca fiber and willow. The bow and arrow and a small curved club are used with skill, but in the making of weapons and the working of wood they are generally inferior.

Houses are built by the women, but the men bring roof timbers, ladder poles, and doorposts from the mountains. The stone

walls are plastered with adobe and whitewashed with gypsum. Windows are left open, or closed with a pane of translucent gypsum. The living room, entered through a hole in the roof, has an earthen floor and a hooded fireplace with chimney. The center of domestic life is not so much the hearthstone as the grinding trough, which is cemented to a low platform. Each compartment of the trough has a sloping slab of hard stone upon which the women grind the corn, using a flat stone in the hands with a motion like that of a laundress over a washboard (Fig. 8). Meal is mixed with water and baked in a jar over a corn-cob fire. "Pancakes" are made by spreading batter on a hot greased stone. Sweetened cakes are baked in an oven and "doughnuts" are fried in hot tallow.

Cornfields and corrals for animals are located on the slopes at the foot of the cliffs, or where a watercourse issues from the mouth of a canyon and spreads over the plain. The farms are often ten miles from the village, and sometimes a man will travel twenty miles to his cornfield, hoe it, and return within twenty-four hours. Firewood and timber are scarce and must be brought long distances. A journey of 200 miles for salt, tobacco, or pine boughs is not unusual. Men in the desert, like other animals, have acquired speed, endurance, and tolerance of hunger and thirst. The Hopi now exchange pottery, cloth, baskets, and silverware for many articles supplied by white men, but they are not generally successful as traders.



FIG. 8.—Hopi Indian girls grinding corn. Notice style of hair dressing, necklace, shawl, and rings.

The division of labor is peculiar. The men raise the crops, care for the animals, and carry the heavy loads, but also weave cloth and knit stockings. The women carry water, grind corn, and cook, but also build and own the houses. The bride takes her husband to her own home. The Hopi are domestic, industrious, peaceful, honest, and very religious. Vice and crime are almost unknown. Their most important institutions are secret societies for the performance of religious rites, like the famous snake dance, which they think is necessary to bring their greatest blessing, rain. They worship the sun and rain gods.

The Pueblo Indians are an interesting example of a people who are sedentary and closely attached to their homes, who live almost entirely by agriculture and make use of irrigation, who build permanent houses of stone or adobe, and who have brought the arts of pottery and textile weaving to high perfection. Yet previous to contact with white people, they did not use iron or other metals and were independent of trade. The Hopi environment is, in most respects, the reverse of that of the Eskimos, yet its resources are scant and the conditions of life hardly less severe. Both peoples live upon the very edge of their means of subsistence. They have adapted themselves to their environments by entirely different means, but with equal ingenuity, and have developed a curious similarity of character and spirit. The Hopi are superior to the Eskimos because of coöperation on a larger scale, their economic unit being the village or tribe instead of the family.

The Pueblo people do not depend upon collecting what nature provides, as the Eskimos and South Sea Islanders do, but they actually produce means of subsistence where few or none are to be found. *They do not pick up a living, but they make a living.* Their activities and abilities are more varied and their life is more complex than in the case of mere collectors. They have acquired the rudiments of agriculture and the domestic arts which, in a more favorable environment, would form the basis of a high civilization. Their population is decreasing.

The Amazon People. — The Amazon River system drains an area of South America as large as the United States. The whole basin, except the mountain slopes on the west and north, is a vast plain gently sloping toward the river and the sea. The sun in its annual swing north and south crosses the basin, and is directly over every part of it twice a year, bringing a belt of hot, rising air and heavy rains. During this season more rain may fall in a day than falls in temperate regions in a whole year. When the sun is not overhead, the trade winds sweep in from the Atlantic and bring rains, which increase westward and are very abundant on the slopes of the Andes. The air is always hot and damp, and there is little change of weather from month to month, except more or less of rain. The rainfall of the whole basin is so great that the rivers are of immense volume, some of them scores of miles wide from bank to bank, and at some seasons inundating the country on either side for hundreds of miles.

On account of the constant heat and moisture, the Amazon basin is covered with a growth of almost unbroken forest, the tallest, densest, and most extensive in the world. Along the streams it presents a solid and apparently impenetrable wall of vegetation. There are no openings and nothing within is visible a yard away. A clearing reveals a bewildering diversity of gigantic trees, whose trunks rise 100 to 200 feet and support a dense roof of foliage, through which the sunlight can scarcely penetrate (Fig. 9).

These trees are draped with creepers and climbing vines, called *lianas*, which are interlaced over the ground and in the air in tangled confusion. Air plants anchored to the trunks and limbs send down long, slender roots like hanging ropes. A man can hardly take a step into the forest without cutting his way; to penetrate it two miles in a day is a severe task, and a path or road is like a cool, dark tunnel. If a space is cleared, it will be overgrown and filled up in a year or two. Unlike a temperate forest which is made up of a few kinds of trees, the Amazon forest contains hundreds of species on every square mile, among which palms in great variety are conspicuous. The tree tops are populous with birds, monkeys, and sloths.

Rodents of several species and deer inhabit the ground. The peccary, tapir, and jaguar, or mountain lion, are the largest mammals. Lizards, turtles, and snakes, some poisonous and some 50 feet long, are plentiful. The forests and streams swarm with insects, among which beetles and butterflies are attractive, and ants, spiders, mosquitoes, ticks, and sandflies are troublesome. The waters abound in alligators and fish, some of which are dangerous to bathers and some are excellent eating. The streams furnish the only routes by which the forest can be traversed for any considerable distance, but large steamers can ascend the river and many of its branches for thousands of miles, and canoes can go in almost any direction.

The aboriginal Indian inhabitants have been considerably mixed with negro and Portuguese stock, but the dense vegetation excludes a large human population of any kind. Malarial and yellow fever and other tropical diseases are often fatal to white men, and deaths from poisonous animals are frequent. Agriculture is possible only in small patches beyond the reach of floods.

The labor of clearing the ground and keeping it clear of wild growth is enormous. The Indians in the more remote parts live chiefly upon wild roots, fruits, and nuts and by hunting and fishing. They use bows five or six feet long and arrows of equal length tipped with iron.

The peculiar and efficient weapon of the Amazon Indians is the blowgun, made of the stem of a reed or of a species of palm (Fig. 9). It is ten or fifteen feet long and an inch or two in diameter. It weighs only two or three pounds and is easily handled. The missile is an arrow, made from the ribs of a palm leaf, eight inches long, straight, hard, brittle, and heavy, but so slender that a bundle of a dozen is no larger than a lead pencil. The point is smeared with the famous *curare* (or *woorali*) poison, which is sure death to a small animal in a few minutes. One puff of breath will send the arrow 100 to 200 yards, and any animal scratched by the poisoned tip seldom escapes alive. Turtles and their eggs are taken on the sandbars, and a large fish weighing 200 pounds is shot with arrows. Canoes 40 feet long are made by hollowing out a log and spreading it in the middle by crosspieces.

Rain-proof shelter is easily and quickly made of poles and vines covered with palm leaves, which are sometimes 30 feet

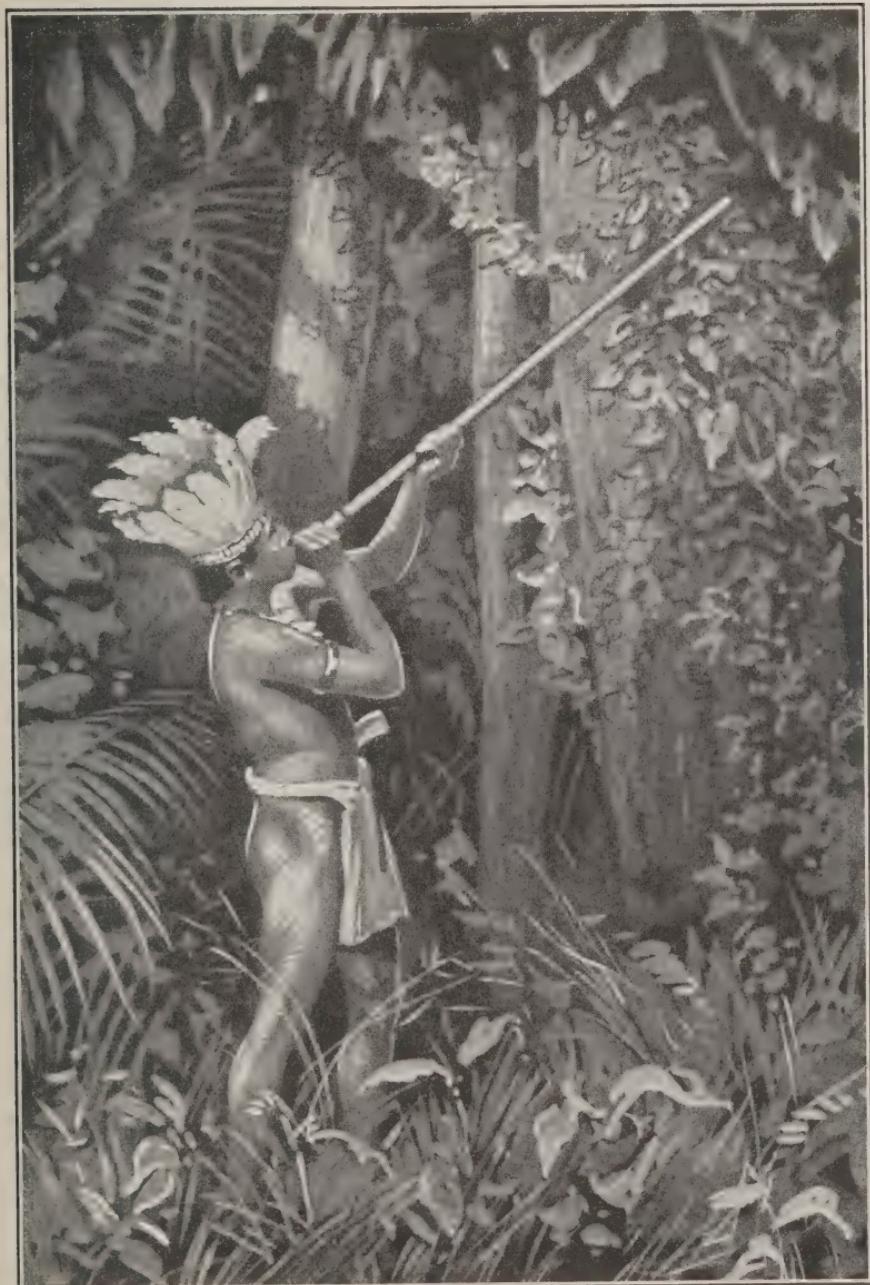


FIG. 9.—Amazon Indian with blowgun.

long (Fig. 10). Some tribes build communal houses 100 to 150 feet long, 75 feet wide, and 40 feet high. The frame is made of smooth, straight tree trunks set in the ground and tied together with vines. The walls and roof are of palm leaves which keep out the rain and let out the smoke. Palm-leaf partitions separate the quarters of the different families, of which as many as 50.



FIG. 10. — Home in the Amazon forest.

comprising 250 men, women, and children, find homes under one roof. The only indispensable piece of furniture is the hammock, woven of grass fibers or cotton. Its use is so general that the Amazon basin might be called the land of the hammock. It is easily made, light, portable, can be hung almost anywhere, and protected from ants and vermin, it serves well for both chair and bed. The Indians weave baskets, and make pottery by coiling ropes of clay upon a flat base and burning the vessel in a nest of the white ant converted into an oven.

Among the hunting tribes, the men wear only a belt and breechcloth, while the women regard red, yellow, and black paint, or a purple dye poured

over the head and shoulders and allowed to run down over the body, as sufficient clothing. Ornament is confined to the men, who dress their hair, tie it in a queue with a comb at the top, crown the head with parrot feathers, wear necklaces and bracelets and a girdle of jaguar teeth, and stick two feathers through the nose in place of a mustache. Some remote tribes wear no clothing of any kind and eat human flesh.

The people who have come much in contact with the whites have adopted more or less European clothing. With them also agriculture is more important. They grow sugar cane, a kind of potato, yams, peppers, tobacco, bananas, pineapples, and even corn, which is used chiefly for making an intoxicating drink.

The staple crop and vegetable basis of subsistence throughout the Amazon region is the *manioc*, or *mandioca*. This is a straggling shrub five or six feet high, with long, thick roots like those of a dahlia. The men clear a patch of ground by cutting and burning, and the women plant cuttings of the manioc. There is no plowing or cultivating. The fresh roots when grown are bitter and poisonous. They are allowed to ferment in stagnant water, are peeled, grated, and sifted, and the resulting paste is strained in a long, narrow bag like a stocking leg, which is hung up at one end and stretched by a weight at the other. It is then roasted on an earthen pan over a brush fire. The material thus purified is known as *farinha*, and when freshly made tastes like pop corn, but when old like sawdust. The pure starch which drains from the bag is known in commerce as tapioca.

In the Amazon forest nature is too much for man. Plant and animal life is so vigorous that human life is almost crowded out. The forests cannot be cleared, the dangerous animals cannot be exterminated, most of the country is impenetrable, and in the face of such obstacles men seem as helpless as babes. The scattered Indian tribes are literally lost in the woods, and there are millions of people who have never seen a white man. Shut in to struggle with the forest, they are less successful than the Eskimos with the ice or the Hopi with the desert. The

great natural wealth of the country has not so far been of much use to the natives, either directly or indirectly by bringing commerce and contact with civilized people.

There are many native plants and nuts which would be of value if they could be shipped, of which the well-known Brazil nuts are an example. The enormous wealth of the country in timber is not at present available on account of the cost of transportation to civilized countries. There are some sugar and chocolate plantations, but most commercial enterprises are crowded out by the climate and the forest.

The principal article of export is Para rubber. This is obtained from two or more species of tree, of which the best grows upon flooded ground near the streams. It is a tree about 60 feet high, with smooth, gray bark and thick, glossy leaves. A V-shaped cut is made in the bark and a cup fastened under it. This is repeated every day and about a tablespoonful of creamy liquid is secured from each cut. The liquid is spread on a wooden paddle and smoked over a palm-nut fire, the process being repeated until a ball is formed which looks and smells like a ham. This is the crude rubber of commerce. The business of collecting rubber is carried on by organized companies, which send white men and Indians into the forest to find and tap the trees and bring the rubber to their stations along the river. Rubber trees have become scarce near the streams, and each year the collectors are obliged to penetrate farther into the forest. Working alone and exposed to disease and danger, the whites die, the Indians are enslaved, and neither get more than they spend at the stations during the season of flood. Thus the business, as conducted, destroys the sources of supply, impoverishes the country, degrades the natives, and enriches foreign people at their expense.

The People of the Steppe. — Near the center of the great land mass of Eurasia, where the loftiest highlands in the world slope to the Caspian plains, lies the Russian province of Turkestan. The summer is hot and dry and the winter is cold, but on the plains there is a season of light rainfall, increasing up the slopes to an elevation of about 12,000 feet, above which the snow is nearly perpetual. Grass is everywhere luxuriant in its season and interspersed with a great variety of brilliant flowers. Such treeless, grassy tracts in Eurasia are called *steppes*, from a Russian word meaning a plain. It is an empire of grass, but grass always

dependent upon an inconstant water supply. The best pasture is in the saturated ground along the edge of the melting snow. The plains are too dry for agriculture and the plateaus are too cold, yet both produce vegetation at different seasons. The inhabitants of the steppe, called Kirghiz, are yellow-skinned, black-haired, slant-eyed herdsmen who have no permanent homes, but wander about to find pasture for their animals.

The Kirghiz keep all the most valuable species of domestic animals, but sheep are the most numerous, and supply milk, meat, wool, and hides. They are large and have tails so loaded with fat as to drag on the ground. Goats are kept for milk, and to lead the sheep across streams and over rough ground. Cattle are raised for milk and hides, but beef is poor and seldom eaten. Oxen and the more hardy yaks are used for riding and pack animals. A few camels are kept for milk and hair and as beasts of burden. They are rather delicate and must be protected from cold in winter and from insects in summer, but will carry a load of 800 pounds about fifteen miles a day.

The animal most highly prized is the horse, which is used for riding, never for packing or draft. The mares are milked and young colts are sometimes eaten. The horse endures heat and cold better than dampness. The cropping teeth and small stomach, the round, barrel-like body, the combination of levers in the legs and the solid, elastic hoof are perfectly adapted to life on dry, grassy plains. Under such conditions the horse is the most efficient of animal motor machines. On the steppe he is spirited, good-natured, docile, courageous, and enduring, and becomes the standard of wealth and value. A man without a horse is a pauper. Kirghiz men and women are more at home on horseback than on the ground. Very young children are kept astride a block of wood, and infants learn to ride on dogs and sheep. At three years of age a child can sit on horseback with its elders and at eight is a good horseman. The favorite sport of the Kirghiz is horse racing, in which these fearless and careless riders gallop up hill and down over any kind of track to some point ten or twenty miles distant and return. They hunt wolves, foxes, and wild sheep with hounds and falcons.

For clothing the Kirghiz produce at home wool, hides, camel's hair, goat's hair, and furs, and they buy cotton and silk. The principal garments for men are shirts, trousers, long quilted gowns wadded with wool, sheepskin coats, felt hats, and rawhide

boots. The women wear trousers, a long robe tied with a girdle, and a large, twisted turban of cotton or silk ornamented with silver and embroidery. They must not be encumbered with furniture or baggage; so their dwellings and utensils are all designed to be easily movable. The *yurt*, or *kibitka*, is a large round tent with a frame of upright poles bent and tied to a central ring at the top and surrounded at the bottom by an extensible, wooden latticework (Fig. 11). This frame is covered with mats of grass and sheets of woolen felt. It is light, airy, and comfortable, and can be taken down or set up by the women in half an hour and carried on one camel. When necessary, a few men can lift and remove it bodily to a clean spot. The felt yurt combines the roominess of a house with the lightness of a tent and is the best movable shelter yet invented. A well-to-do family occupies six or eight such tents, which are furnished with woolen felts and rugs, cotton quilts, and sometimes rich hanging of fur, silk, and velvet. The domestic utensils consist of leather buckets, bottles made from a whole sheepskin, wooden bowls and spoons, and a large iron kettle. Each housewife has a wooden chest in which she keeps her treasures of silk, silver, and china, and carries the key at the end of her braid of hair.

Bread is unknown and vegetable food is very scarce, but all parts of animals except the bones are utilized. Every female animal is milked and in summer the people live largely upon dairy products. The milk of sheep and goats is kept separate from the rest for making butter, cheese, and curds. Cow's milk is always soured before use. Their favorite and peculiar drink is *kumiss*, made by fermenting a mixture of mare's and camel's milk in a leather bottle hung in a warm place. It is agreeable, digestible, nutritious, and transportable. It is like a combination of cream and champagne, relieves fatigue of body and mind, and is slightly intoxicating. Travelers report extraordinary good health and strength maintained for months on an exclusive diet of *kumiss*. In winter much meat is eaten, chiefly mutton, the fat of the sheep's tail being regarded as a delicacy. Beef and goat's flesh are poor and little used. Almost the only foreign article of food is tea, of which they are very fond.



FIG. II.—Kirghiz encampment, showing yurt.

The wealth of a single family may consist of 2000 horses, 1000 cattle, 300 camels, and 5000 sheep and goats. By these animals all the plant resources of the country are utilized. Cattle feed on the soft meadow grass, horses on the scant vegetation of rocky land, sheep and goats on coarse, salty herbage, and camels on thorns and thistles. In summer the camp may remain for weeks at the same spot. When the time comes to move, the men take the horses out ahead in herds of fifteen to fifty. The sheep and goats follow, eating continuously as they move. The women and children come last with the tents and utensils packed on camels, oxen, and dogs. They overtake the flocks at midday, and after tying the heads of the ewes and the goats together in a circle, milk them. Later they milk the cows, and the men milk the mares.

The winter camp may be in some protected valley watered by a stream from the mountain snows. The fixed home is a tent of willows and reeds, or a stone and mud house covered with a stack of hay. Poor people who have no herds raise some hardy grain, but the rich scorn agriculture. If the snowfall is heavy, the loss of animals is great, and disease among the animals may bring starvation and ruin. Each family pays taxes to the Russians, but they are exempt from military duty and little interfered with by the government. They exchange wool and horses for grain, tea, cotton, silk, silver, chinaware, and iron, but they are so nearly self-sufficing that trade is small.

Russian settlers have recently established themselves upon the slopes where agriculture can be carried on by irrigation. The nomads pass through this belt on their way between winter quarters and the high pastures, and the trade of cattle products for grain is advantageous to both.

The women take such an important part in family life that they are the equals of the men in position and influence. The men are persistent and untiring horsemen, herdsmen, and hunters, but are otherwise indolent. They make leather saddles and bridles, and decorate weapons with silver and iron, but are averse to any sedentary occupation.

The life of herdsmen and the experience in the care and train-

ing of animals, especially the horse, and in almost constant travel, make the Kirghiz self-possessed, keen of sight, hardy, brave, independent, and, when called upon, excellent fighters. Upon occasion they become fierce invaders and ruthless destroyers of more sedentary people. The substitution of an animal in the place of a vegetable basis of subsistence develops qualities in many respects the opposite of those of the peaceful, agricultural Pueblo Indians. The nomad life forbids excellence in domestic arts and makes social and political organization impossible. Hence nomad people can never become highly civilized.

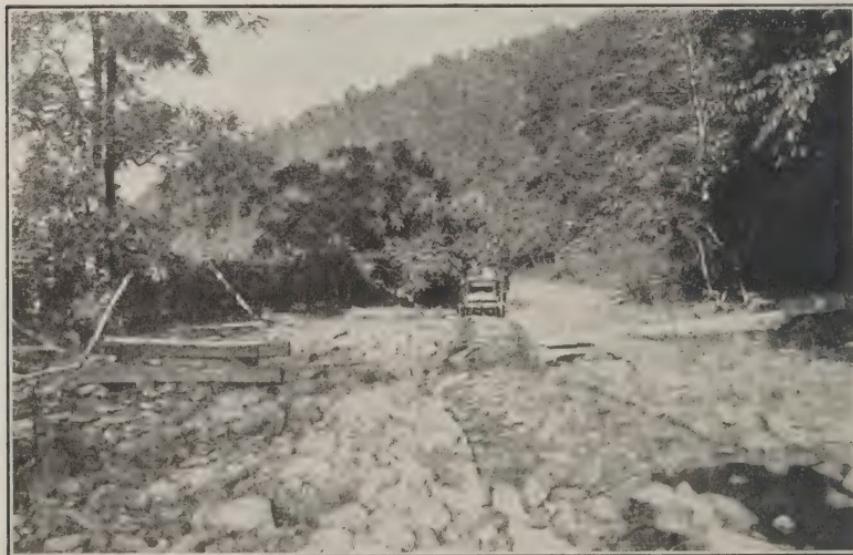
The Appalachian Highlanders. — The mountainous region in southeastern United States, from the Potomac River to Georgia, is larger than New England, and has a population of over 3,000,000 (Fig. 33). Along the eastern border extends the Blue Ridge, a very old range, narrow and much worn down in Virginia, but broad and massive in North Carolina and Tennessee. There the headwaters of the Tennessee River have cut the range into distinct mountain knots, which include the highest land east of the Rocky Mountains, about fifty peaks being over 6000 feet high. Through the middle of the highland west of the Shenandoah and Tennessee rivers, a belt about sixty miles wide is occupied by hundreds of wall-like, parallel ridges, broken by occasional gaps and resembling the surface of a washboard.

West of these, the plateau of West Virginia, Kentucky, and Tennessee, sloping gently toward the Ohio, has been cut by the streams into an intricate system of narrow valleys and gorges, branching like a tree in every direction. The ridges between the streams, 600 to 800 feet high, are as narrow and irregular as the valleys, and there is hardly any level land. The whole region was originally covered almost to the summits with a heavy forest of oak, walnut, chestnut, maple, ash, poplar, and hemlock, and a dense undergrowth of laurel, rhododendron, and azalea. The climate is delightful in summer and never severe, but the rainfall is heavy, the slopes are steep, and the

water runs off rapidly, carrying soil, rocks, and timber down to flood and choke the valleys.

In its wild state, the region was full of game and fish. Squirrels, coons, weasels, minks, and foxes are still common, and bears and wildcats occur on the mountains. The most important animals at present are the "razor-back" hogs which forage upon nuts, roots, and snakes. They are thin, long-legged, and tough-skinned, with a snout like a plow. They run like a deer and climb like a goat, and are said to show cunning and malice in breaking into fields, gardens, and dwellings. They share with dogs, chickens, and geese the hospitality of the yard, porch, and house.

The highlands were settled in some parts before the Revolutionary War by Scotch-Irish, English, and Germans, and the people have changed but little since, preserving the habits of life, speech, and thought which were common in the eighteenth century. Hence they have been called "our contemporary ancestors." Their peculiarities are due in part to the poverty



(Photo by B. H. Schockel.)

FIG. 12.—Bed of a stream used for a road in eastern Kentucky.

of the country, but more to the fact that they are cut off from intercourse with the world by the difficulties of travel. The roads

follow the stream beds (Fig. 12) and are passable only at low water. The few roads that cross the ridges are cut through the forest, washed by storms, and all but impassable. There are few bridges for wheeled vehicles. Teaming is serious work, requiring the fording of streams, the removal of fallen trees, and the climbing of steep, rocky slopes. A narrow sled is cheaper, safer, and more useful than a wagon even in summer. Travel and transportation must be mostly on foot or on horseback, muleback, or oxback. A journey of twenty or thirty miles for salt, coffee, or gunpowder is not uncommon.

The houses are usually made by building a single pen of rough logs, such as four men can put up in a day and leave the owner to finish at his leisure (Fig. 13). The roof is of split boards, three feet long, laid like shingles, and the floor is of plank hewn out with an ax. An opening through the logs is occupied by a chimney made of sticks and mud or stone. The door may be made and hung without nails or metal. There is but one room and commonly but one window. In some cases a lean-to kitchen is added, or two log pens are built with a passage between and the whole covered with one roof. In a short time the timber shrinks and warps, and floor, walls, and roof become full of cracks, some of which may be chinked with mud.

There is little furniture and that mostly homemade. Commonly there are two or more beds in each room, the wooden frame filled in with crossed rope and covered with a mattress of corn husks or straw. Clothes, saddles, guns, dried apples, peppers, tobacco, and herbs are hung on pegs around the room. In many homes, there are spinning wheels, hand looms, and quilting frames for making cloth and bedding. A stove, kettle, frying pan, coffeepot, and a few knives and coarse dishes are almost the only household utensils obtained from the outside. For the men an ax and a rifle or shotgun are indispensable. Kerosene lamps are often used without a chimney, because glass is difficult to carry without breaking. Pine knots and lard lamps are more reliable for lighting. A hollow log serves as a meal barrel, a washtub, a beehive, or a cider press, and baskets are made of hickory withes. There is a box at the spring for cold storage of food, and

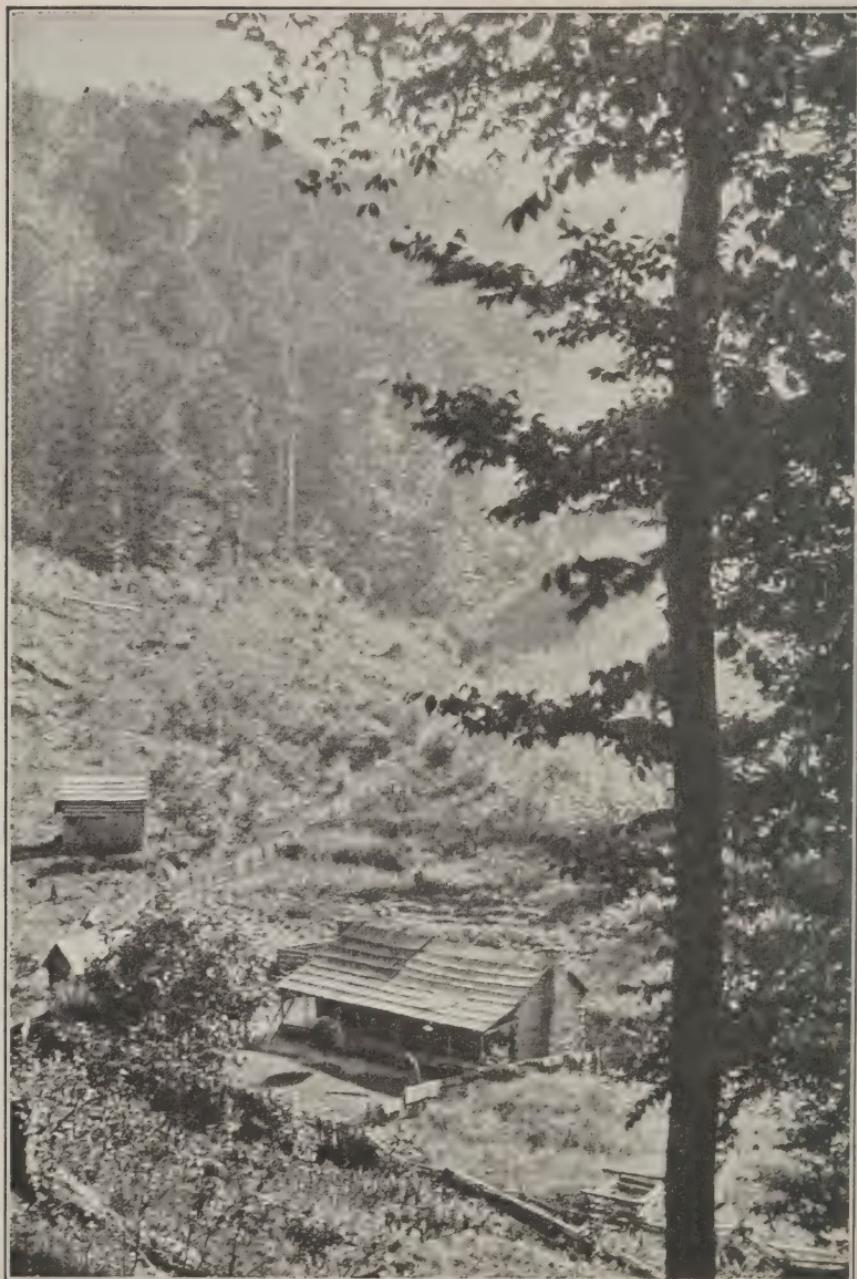


FIG. 13.- A double log cabin in a valley of eastern Kentucky. (*Photo by B. H. Schockel.*)

a block on which soiled clothes are pounded to clean them. Every man is his own farmer, carpenter, tanner, cobbler, and harness maker, and his neighbor may serve as barber and dentist. Whatever is wanted, the rule is "make it yourself or go without."

The people live by farming, lumbering, and hunting, but game has become scarce. There is very little bottom land in the narrow valleys and most of the fields lie on slopes nearly as steep as the roof of the house. On these "perpendicular farms" cultivation is difficult and rude. The plow used is little more than an iron-shod stick drawn by a mule or a steer. The soil is not only poor and thin, but after the timber is cleared, soon washes away. After two or three crops of corn and two of grass, the field becomes worthless and is allowed to grow up to weeds and bushes. Corn is the main crop and the basis of subsistence, but rye, oats, and a little wheat in the valleys are raised. Grain is thrashed with a flail on bare ground and winnowed by pouring from a height where there is a breeze. The mills run by water power are very small, grinding a few bushels a day, and hand mills are still in use. Fruit trees are generally neglected, although the country is naturally a good fruit region. Cabbages, beans, potatoes, and tobacco are raised.

High on the mountains are "balds," or open, grassy tracts, where cattle can forage eight or nine months in the year, but milk, butter, and beef are scarce and of poor quality. There is no way to keep fresh meat and the cattle are driven to market and sold. A few sheep are kept for wool, but they are too delicate and defenseless to flourish in such a country. The fowls are thin and tough, and are poor layers. The people have no taste for dairy products or eggs, and depend upon "corn bread and sowbelly," the latter obtained from the "razor-back" hogs. The cooking is usually bad from lack of skill as well as of material and utensils. Maple sugar and sorghum molasses are semi-luxuries. Ginseng, bloodroot, wild ginger, and other medicinal plants are collected and sold, also galax, hemlock,

and mistletoe for Christmas decorations. Ginseng is the most profitable and is cultivated to some extent by the thriftier inhabitants of this region.

Clothing was formerly made of linsey-woolsey, a mixture of linen and wool, grown, spun, and woven at home; but cheap, ready-made clothing from the outside has caused a decline in the home industry. The women still weave counterpanes of quaint and pleasing patterns, their only artistic handiwork, for which they find a ready sale among the "furriners" beyond the mountains. During the fall and early winter the men cut logs, railroad ties, and stave bolts, which at the "tide," or high water of spring, are floated down the streams to the railroad. They take pay for the timber in goods from stores established by outside lumber companies.

These highlanders are cut off not only from the outside world but from one another. They are almost as rooted to their homes as the trees, and many of the women have never been ten miles away from their birthplace. The houses are strung along the streams and such a linear neighborhood of twenty families must extend at least ten miles. The roads are under water half the year. The people cannot get together to support good schools or churches, and social life and coöperation for any purpose are greatly restricted. The people of one valley are sometimes the hereditary enemies of those in the next.

In more than half the counties there is no town of 1000 inhabitants, and in many counties there is no printing press. Some of the homes cannot be reached by a wagon, as they are situated on steep, rocky hillsides traversed only by foot-paths and trails; and many of them are far from neighbors, post office, school, church, or store.

In one representative community of 88 families, the average size of the farms was twenty-seven acres, of which only eight acres were cultivated, and the total average value of farm products for the year was \$160.

These people are of the purest Anglo-Saxon stock in the United States, unmixed with foreign or inferior blood, and under favorable conditions would be the equals of the best Americans. Their development has been arrested and they have been kept in a primitive condition, because they are isolated from the rest of the world and from one another, and are condemned to poverty by the rugged relief of their natural environment. Nature holds them as in a vice, and refuses them a share in the general progress of their country. The real wealth of the highland in timber, coal, oil, and water power cannot be utilized without knowledge, capital, and coöperation beyond their reach.

To the inhabitants of more favored lands, it seems marvelous that 3,000,000 of their own kinsmen can succeed in maintaining themselves in such an environment. They are illiterate and intolerant of new things, but simple, direct, honest, fearless, hospitable, and intensely loyal, as was amply shown during the Civil War. They are an instructive survival from the days when the whole country was new, and show how the pioneers of every state east of the Mississippi had to live, each family or community providing for its own simple wants without depending upon commerce, domestic or foreign.

Simple Economies — Conclusions. — These stories of simple economies practiced in different environments show what can be done by people who depend upon their home resources. In each case they have successfully adapted themselves to the conditions in which they were born, and make the best living possible as long as they supply their own wants and obtain little or nothing from the rest of the world. They are prevented from making a better living by lack of material and lack of knowledge. A steel ax would help the Yahgans to build better boats and houses. They have iron ore, and wood for fuel, but have no idea how to use them to extract the metal. There is good coal in Greenland, but it is of no more use to the Eskimos than any other rock. Firearms would be of advantage in killing seals,

bears, caribou, and musk oxen, but their introduction by white men threatens to kill off these animals so rapidly that the native basis of subsistence will be destroyed and the Eskimos will perish of famine. The use of wooden houses, coal stoves, and woolen clothing on the Arctic shores of Alaska has not improved the health or happiness of the natives. In the polar regions there are not enough sunlight and heat to make plants grow, and without vegetation it is impossible for human life to be much more than a bare struggle for existence.

The South Sea Islands are small patches of land surrounded by a wide expanse of water, and lack variety of resources and people. The absence of all metals is a serious defect. In the Pueblo environment the greatest need is water, without which only a scant vegetation is possible and animal and human life is correspondingly meager. In the Amazon forests men are overwhelmed and suppressed by the abundance and luxury of nature. On the steppes there is but one resource, pasture grass, and men are compelled to move about to find it. They cannot make use of the common appliances of civilized life because they cannot carry them. In the Appalachians the crust of the earth is at fault. The soil is poor and the surface so rough that there is little available land. Only a scant population can make a living by agriculture. The people have little use for timber, coal, and oil at home. Their only chance to improve conditions must come from the employment of outside capital to exploit these resources. For this purpose railroads are essential, and would break up in some degree their isolation and bring them under the economic influence of their lowland neighbors. But these highlands must always remain the home of a relatively poor and primitive people.

QUESTIONS

1. What is meant by economic relations?
2. How have the differences between limpets and seals affected the habits and character of the Yahgans and Eskimos?

3. What is the most important contrast between the environment of the Eskimos and that of the South Sea Islanders? between the environment of the Pueblo Indians and that of the Amazon peoples?
4. Which tends to breed better men, extreme heat or extreme cold? extreme dryness or extreme moisture?
5. Which is the more favorable home for civilized people, the steppes or the mountains? Why?
6. In which of the environments described in this chapter would you prefer to live? Why?
7. Among the peoples described in this chapter what are the necessities of life? the comforts? the luxuries?
8. What is the one thing indispensable for the maintenance of human life anywhere?
9. Is clothing a necessity or a luxury?
10. Which peoples build shelter for protection against cold? rain? animals? human enemies?
11. Which peoples live largely on vegetable food? on animal food? on a mixed diet?
12. Why are fish so commonly used by people who practice a simple economy? What kind of food do fishes live on?

CHAPTER III

THE STUDY OF HOME ECONOMIES

THE simple relations shown in the preceding chapter as existing between various peoples and their environments may help the student to understand the more complex relations of his own community. A study of the home economies by which his own family and their neighbors get a living should now be undertaken. These furnish a wide field for original investigation which should be continued throughout the term or year according to convenience. Studies in the field and in the text should usually be carried on together and will be found to enliven and enlighten each other.

It is impossible in a textbook for general use to give detailed directions that will cover the ground in every locality. The following outline will apply to most communities in the United States, but should be adapted to meet the needs of each class. To devote about half the time to this work while the other half is given to Chapters IV–VIII of the text will prove an agreeable and stimulating change. Different topics of the Outline may be assigned to individual pupils for investigation and report.

OUTLINE FOR A STUDY OF HOME ECONOMIES

I. **Gainful Occupations.** What are the people doing for a living? Make a list of the different kinds of work or business carried on for gain or profit. These may be classified as follows:

- A. *Agriculture*, general farming, special crops, gardening, fruit growing, dairying, stock raising, poultry keeping, etc.
- B. *Lumbering*, cutting and sawing timber, ties, etc.
- C. *Mining and Quarrying*, mining coal, ore, oil, gas, and other minerals, quarrying stone, excavating clay, sand, or gravel.

D. *Hunting and Trapping* land animals.

E. *Fishing*, capturing aquatic animals.

F. *Manufacture*. 1. Foodstuffs. 2. Textiles and leather. 3. Clothing, shoes, gloves, hats, etc. 4. Building materials, lumber, brick, lime, cement, glass, etc. 5. Furniture, household goods, crockery, etc. 6. Iron and steel, rails, engines, machines, tools, etc. 7. Other metals, copper, lead, zinc, tin, gold, silver, plated ware, jewelry, etc. 8. Vehicles, ships, cars, wagons, motors, etc. 9. Chemicals, medicines, liquors, etc. 10. Tobacco. 11. Paper, printing, and publishing. 12. Other manufactures.

G. *Communication*, post office, telegraph, telephone.

H. *Transportation* by water, rail, wagon, etc., of passengers and goods.

I. *Commerce*, buying and selling goods, wholesale and retail.

J. *Finance*, banking, brokerage, etc.

K. *Professional Service*, engineering, army, navy, medicine, law, religion, education, drama, art, music, journalism, literature, etc.

L. *Domestic and Personal Service*, cooking, housekeeping, table waiting, laundering, barbering, etc.

M. *Skilled Labor*, constructive trades and handicrafts, mason, brick layer, carpenter, structural iron worker, painter, paperer, plumber, tinner, builder, contractor, steam engineer, potter, machinist, blacksmith, and other occupations not included in F.

N. *Common Unskilled Labor*.

Which of these occupations are followed in the community? What proportion of the population is engaged in each? What conditions, natural and human, make these occupations profitable in this locality?

II. *Food*. What do the people eat and drink? A list of the principal articles of food used in the community: 1. Cereals and breadstuffs. 2. Meats and fish. 3. Dairy products. 4. Vegetables. 5. Fruits. 6. Flavors and condiments. 7. Luxuries and delicacies. 8. Liquors. 9. Water supply. Where do the articles come from? How are they produced? How are they prepared for the table? How are they transported from the place of production and distributed to consumers? What proportion is home grown? What proportion is imported from foreign countries?

III. *Clothing*. What do the people wear? A list of materials and articles used for clothing: 1. Textiles, cotton, woolen, linen, silk, straw, etc. 2. Leather. 3. Rubber. 4. Furs. 5. Ornaments, jewelry, feathers, etc. Where do these articles come from? How are they made? How are they transported and distributed? What are the proportions of domestic and foreign goods?

IV. Housing. How are the people housed? A list of materials used in construction: 1. Wood (kinds). 2. Stone (kinds). 3. Brick. 4. Iron and other metals. 5. Cement and plaster. 6. Other materials. Where do these materials come from? How are they made? How are they transported? For what part of the building is each used? Why? A good house or other building should be observed while under construction. What materials are used for public buildings? for business buildings? for the best residences? What are the proportions of best, good, and cheap residences in the town or city? Why are the best residences located where they are? the good residences? the cheap residences?

V. Household Equipment. How are the houses furnished for convenience, comfort, and beauty? A list of articles of furniture and household goods: 1. Furniture. 2. Carpets. 3. Bedding. 4. Tableware. 5. Cooking utensils. 6. Wall paper. 7. Paint. 8. Hangings. 9. Pictures. What fuels are used for heating and lighting? Where do they come from?

VI. Manufactures. What manufacturing industries are carried on? A list is given in I, F. What are the sources of power used in each? Where do the raw materials come from? Where are the products marketed? What is the annual value of the products? How much capital is invested? How many people are employed? How much is paid out annually in wages? Why is the industry located where it is? Why is the manufacturing district of the town located where it is?

VII. Transportation. How are people and goods moved? A list of means of transportation: 1. Waterways. 2. Railroads. 3. Wagon roads. 4. Trails. What kinds and sizes of boats are used? What places, regions, or countries do they reach? What kinds of freight are carried? What is the average cost of carrying one ton one mile? What are the annual tonnage and value of goods carried? How many passengers are carried annually? What steam railroads serve the community? what electric railroads? What regions or places do they connect? How many trains are run each day? What kinds of freight are carried each way? What are the freight rates per ton-mile? How many carloads of freight are received and sent out annually? What raw materials are brought in? What finished products are shipped out? Do all the railroads carry the same kinds of freight? if not, why not? Why are the passenger depots and freight houses and yards located where they are? How many passengers are carried? Of what are the wagon roads and principal bridges constructed? Why is there much travel on some and little on others? At some point on a main thoroughfare note the number and kind of vehicles

which pass each way and the contents of the loaded wagons. Count the people who pass, riding or walking.

VIII. Commerce. In what lines of commerce are the people engaged? A list of commercial houses, wholesale and retail, in a city may be found in the City Directory or Telephone Directory. Why are the wholesale houses located where they are? What is the value of the goods, foreign and domestic, received by them? Over what territory are they distributed? What kind of retail store is most numerous and widely distributed? Why? What kinds of retail stores are few in number and confined to the business district? Why? Why is the retail shopping district located where it is?

CHAPTER IV

THE NATURAL FOUNDATIONS OF HUMAN ECONOMY

NEARLY three fourths of the earth crust is covered by water in which there is abundant life but no foundation upon which to maintain a home for men. One half the land area is either cold desert or warm desert, and almost uninhabited.

To create an environment favorable for the existence of human life on any large scale and with a fairly high standard of living, many conditions are essential:

1. There must be solid ground and space to stand, live, and work upon, without overcrowding. The area and distribution of land are determined by the relief of the earth crust.
2. The ground must be covered with a plentiful but not too luxuriant growth of vegetation, in which both herbs and trees, grass and forest, play an important part. This requires a good soil and a moderate rainfall with sunshine and mild temperature during one half the year or more. This is the only source upon which a sufficient and constant supply of food, clothing, and materials for implements and shelter can be maintained.
3. There must be fresh water on or near the surface for the use of animals and men.
4. The earth crust must contain available minerals, such as coal, clay, stone, and ores of iron and other metals.
5. The surface of the land must be smooth and level enough to be easily cultivated and to permit the movement and circulation of people and products. The most favored lands are bordered by the sea and have access by water to all parts of the world.
6. There must be some sources of power superior to human muscle to do a large part of the work. This may be obtained from animals, from the wind, from streams, and from burning fuel, such as wood, coal, oil, or gas.

People living in an environment in which one or more of these things are lacking labor under a corresponding disadvantage.

The most prosperous people are those living where all of them exist in the highest degree.

Vegetation an Index of Economic Value. — In any country the coat of vegetation on the ground reveals the economic life which exists or is possible there as accurately as people's clothes reveal their occupation and social standing. Plants supply so many human wants that wherever they grow in sufficient abundance and variety other resources may be almost dispensed with. The growth of a favorable flora implies the existence of fertile plains, sunshine, heat, water, streams, and useful animals. Vegetation is so intimately related to human life on the one hand and to natural forces on the other that it furnishes a convenient standard by which to estimate human environments and to grade economic regions.

Plants Require Soil. — Most plants are anchored to one spot by their roots which spread out through a large mass of soil. The soil is composed of clay, sand, and gravel — a sort of rock flour or meal, formed by the crumbling and decay of solid rocks. It generally contains *humus* or decaying vegetable matter, which gives it a dark color. Productive soil must be moist and able to hold a large quantity of water which clings as a thin film to the surface of the particles. This film water holds in solution salts of nitrogen, potash, phosphorus, lime, and other elements which the plants must have for food. In order to get enough of these salts, the rootlets absorb great quantities of soil water, which passes up through the stem and mostly evaporates from the leaves. The water or sap in plants takes the place of blood in animals, carrying food to all the tissues. When there is not enough water to keep the cells full and swollen, the plant wilts and perhaps dies.

Plants Live Largely on Air. — By means of their leaves most plants expose a large surface to the air and sunlight. The leaves absorb oxygen and carbon dioxide from the air, and when the sun shines the green substance in the leaves combines the gases from the air with the water and salts from the soil, and manufactures from them starch, sugar, fiber, and other tissues of the plant. *Thus, sunlight acting upon green matter in plants makes the plant grow and converts air, water, and soil into food for animals and men.* This process cannot go on unless the temperature is well above freezing, and is more active at higher temperatures up to 100° or more. Some plants manage to grow a little and produce seed in a few weeks of cool, cloudy

weather, but most plants require several months of warmth and sunshine. The most luxuriant vegetation is found near the equator where it is hot and wet all the year around, as in the Amazon forest (p. 27). In warm deserts the sunlight and heat may be intense, yet the vegetation is scanty and stunted because there is little or no water in the soil.

Plants Adapted to Air and Soil. — The number of different kinds of plants in the world is enormous. About 150,000 species have been described and named by botanists. These species are adapted to different conditions of air and soil in an almost endless variety of ways. In a lawn, meadow, garden, or field only one or a few species may be found because all others are artificially kept out. But even in small patches of natural vegetation there are generally many kinds differing widely in form, size, and habit, but all adapted in one way or another to the same environment. Such groups are called plant *societies* or *formations*, and resemble communities of people who live under the same general conditions, but get their living in different ways.

The land surface may be divided according to its vegetative covering into woodland, grassland, and desert:



FIG. 14.—Grassland, a western prairie.

1. *Woodland* is occupied by trees, shrubs, and woody plants which persist and grow year after year, and are close enough together to shade the ground and exclude most other plants. Trees are deep-rooted and do not depend on frequent rains or a rainy growing season, but may flourish wherever their roots can reach down to water. Thus they may endure long seasons of



FIG. 15.—Vegetation along a dry watercourse in the desert, Arizona.

drought and intense cold. They require a moist subsoil and a warm growing season, and suffer from dry winds in winter when the ground is frozen.

2. *Grassland* (Fig. 14) is covered with low, soft, herbaceous plants among which grasses predominate. They are shallow-rooted and their growth is dependent upon a moist surface soil. They require frequent rains during the growing season. In many species the conspicuous parts of the plant die every year, after producing seeds, bulbs, tubers, or some other organs, which can rest over a season of drought or cold and start new plants when conditions are favorable.

3. *Deserts* (Fig. 15) are regions which, on account of lack of soil, dryness of the ground, or persistent low temperature, are

very unfavorable for vegetation of any kind. Large tracts absolutely devoid of plant life are rare, but vegetation is stunted and scattered, leaving much of the ground bare. In adapting themselves to hard conditions, desert plants have become very odd and peculiar (Fig. 20).

Summary. — Human life is so far dependent upon plants that the natural vegetation of any region is an index of its value for human economy. Plants are distributed over the land in zones corresponding to the length and temperature of the growing season, and the zones are broken up into regions according to the amount and season of rainfall. In short, *vegetation is controlled by climate, and plant zones and regions correspond closely to climatic zones and regions.* (See Fig. 18.)

QUESTIONS

1. There are thousands of sailors who spend most of their lives on the sea. How are they dependent on the land?
2. What changes in the earth crust or in the sea would increase the area of the land? decrease it?
3. Could men live without using solid minerals? What kind of living would they get?
4. What are the advantages of living near the sea?
5. How do clay, sand, and gravel differ? Which can hold the most water?
6. Are the ashes left after wood is burned derived from the soil or the air? What proportion of the weight of wood is derived from the air?
7. Do plants take in more food at night or in the daytime? In which do they grow faster?
8. Count the number of kinds of plants growing in a space 10 feet square in a field and 100 feet square in a forest. How many kinds of plants grow in your county or state?
9. How do the plants growing in a marsh or swamp differ from those growing on dry land?
10. How does the vegetation on a sand hill differ from that on a clay flat? Why do they differ?

CHAPTER V

PLANT REGIONS AND RESOURCES

THE economic conditions and possibilities for human life in any region are dependent primarily upon its vegetation. The general character of vegetation varies with the climate. Differences of temperature, sunshine, and rainfall determine what kinds of plants may exist or flourish. Hence, climate, vegetation, and human economy are bound up together so closely that climatic regions, plant regions, and economic regions are broadly identical. They may be described together and named from their characteristic vegetation, which is a conspicuous feature in all lands. It attracts the attention of every traveler and is easily understood from pictures and descriptions.

Zones of Temperature. — The plant regions of the earth may be arranged in nine heat belts or zones of temperature, one along the equator and four on each side of the equatorial zone (Fig. 17) :

1. The Polar Caps.
2. The Cold Temperate Zones.
3. The Temperate (so-called) or Intermediate Zones.
4. The Subtropical or Warm Temperate Zones.
5. The Equatorial or Intertropical Zone.

In mapping and describing temperature zones, all statements about temperatures apply strictly to lands near sea level. Elevation transfers any particular region from the zone proper to its latitude to some zone nearer the pole. The tops of the highest mountains near the equator have a climate like that of the polar caps.

The vegetation in each zone is controlled more by the temperature and duration of the growing season and the amount and season of rainfall than by all other conditions.

The Polar Caps. — The polar caps surround the north and south poles and extend in some places beyond the polar circles (Fig. 17). The average temperature of the warmest month does not exceed 50°, and the precipitation, mostly in the form of snow, rarely equals ten inches of rainfall for the year. The winter is a period of eight or nine months, during a part of which the sun does not rise at all, and at no time rises far above the horizon. In summer either the sun does not set at all for weeks or months, or the days are nearly twenty-four hours long. In spite of this, the sun's rays are so slanting, and there is so much snow and ice on the ground that the growing season is short, foggy, and cold.

Ice Desert and Tundra. — The plateaus of Greenland and Antarctica are covered with a cap of ice and snow more unfavorable to vegetation than bare granite (Fig. 18).

The polar lowland is generally a treeless moor, called *tundra*. The subsoil is permanently frozen, and when the surface thaws in summer the drainage is very poor and the ground marshy. The hollows are occupied by patches of moss and the rocky projections are covered with lichens. In some places there are clumps and tussocks of coarse grass, and dense, cushion-like masses of stunted willow, birch, and alder. The mosses and lichens do not die in winter, and there is food all the year around for reindeer, caribou, and musk oxen.

The tundra of the polar lowlands and native economy in the polar caps have been described on pages 17-19. The commercial resources of the region are derived from the sea. There are five or six species of seals whose fur and fat find a market in civilized countries. Whaling vessels go every season to arctic and antarctic waters and bring back cargoes of whalebone (worth \$10,000 a ton) and whale oil. The world would not suffer seriously if there were no polar caps, yet they supply whalebone and sealskin for which there is no good substitute.

The Cold Temperate Zones. — The polar cap in each hemisphere is surrounded by a cold temperate zone, which has a

temperate season and a cold season. On the polar side the cold season is the longer, and on the equatorial side the temperate season is the longer. There is no hot season, the temperature of the warmest month being below 70° . The growing season lasts less than half the year. Except on lands exposed to west winds from the ocean, the rainfall is less than twenty inches.

Coniferous Forests.

— The American and Eurasian tundras are bounded on the south by a wide belt of forest, which extends right across both continents (Fig. 18). It is composed almost exclusively of trees having leathery, needle or scale shaped leaves, which with few exceptions are evergreen, like the pine, fir, spruce, cedar, and larch (Fig. 16). The fruit of such trees is a scaly cone holding the seeds between the scales, hence such trees and forests are called *coniferous*.

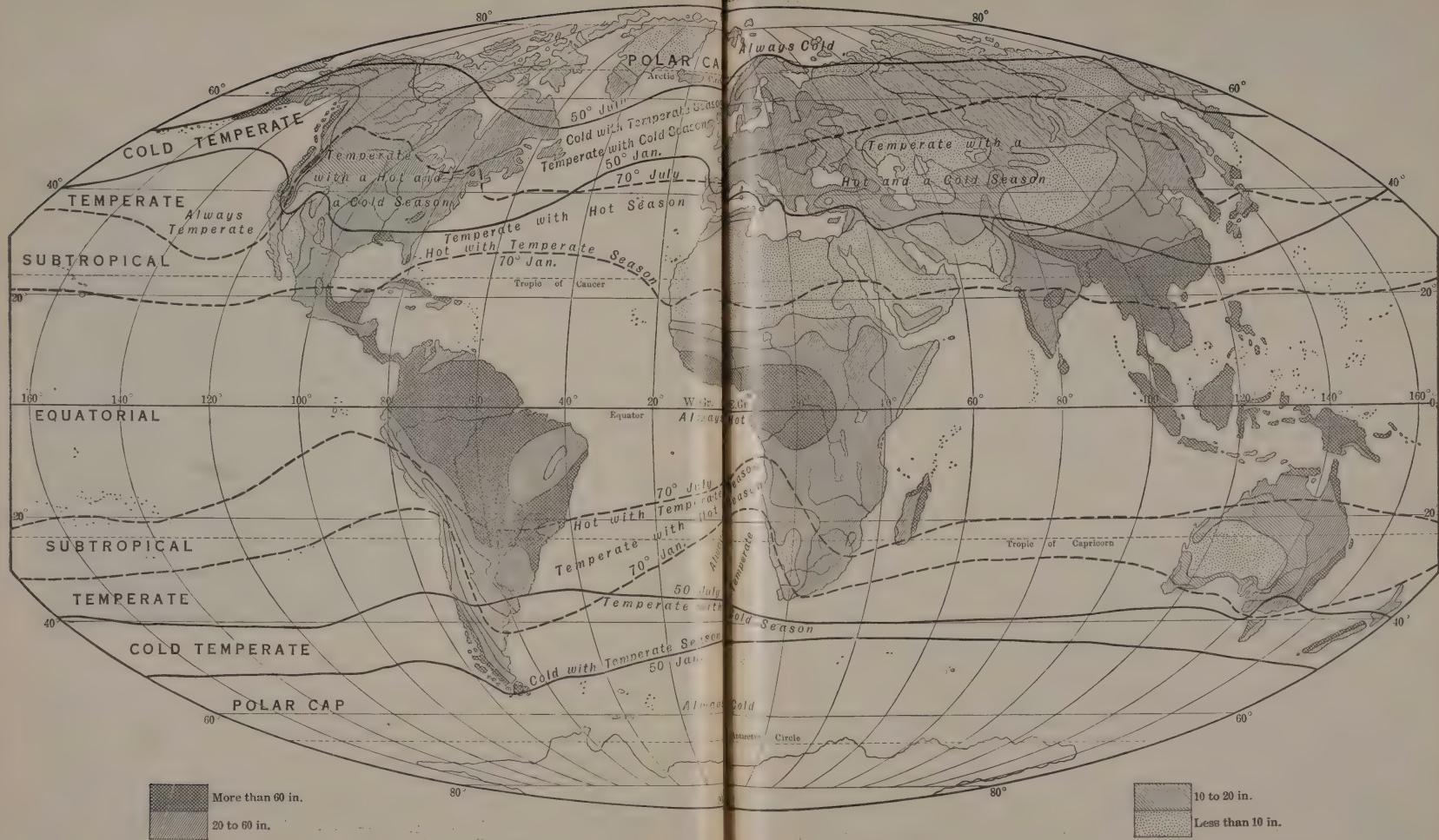


FIG. 16.—Pine forest, Minnesota.

The small surface and thick skin of the leaves restrict the evaporation of water when the ground is frozen dry. The straight central trunk and short branches toward the top enable the trees to stand against strong winds. The narrow, drooping, slippery foliage permits the snow to slide off. Hence, coniferous trees are adapted to regions where the winters are very cold, and the rainfall and evaporation scanty. The snow, which begins

Figure 17. MEAN ANNUAL RAINFALL

After J. G. Robertson



to fall in autumn, accumulates without melting and becomes very deep before spring. Thus the roots are protected and the trees are enabled to survive the coldest weather known on earth. The soil is generally poor and in North America largely of glacial origin. The Siberian forest extends southward into that part of the temperate zone which has cold winters, and westward across northern Europe where the rainfall is below twenty inches.

In coniferous forests animals find shelter and winter food. The bison, caribou, deer, and moose are permanent inhabitants, or winter visitors, living on twigs and leaves. The fox, mink, marten, otter, ermine, squirrel, hare, muskrat, and formerly the beaver, occur in great numbers. They can endure the climate only when protected by a dense coat of fur. Consequently the finest furs come from Siberia, Canada, and Alaska.

Outside the cold temperate zones, coniferous forests occur upon mountains where cold temperate conditions prevail and on some dry, sandy soils in temperate regions.

Most of the timber used in the construction of houses and ships and in general carpentry is obtained from coniferous forests. The wood is soft, light, strong, and lasting, and the trees are so large that timbers and boards may be cut of any desired dimensions.

The Temperate or Intermediate Zones. — A truly temperate climate, in which the average monthly temperature is never below 50° and never above 70° , belongs to the ocean and scarcely exists on land. The large areas of land in this zone are temperate only in spring and autumn, while the winters are cold (below 50°) and the summers are hot (above 70°). These are the only regions having four well-marked seasons and they might properly be called "intemperate." The growing season includes about half the year.

The weather in the intermediate zones is more variable than anywhere else in the world. This is due to a constant procession of rotating storms (cyclones, *not tornadoes*) which sweep across sea and land from west to east. They are accompanied by

PLANT REGIONS

After Schimper and Others.

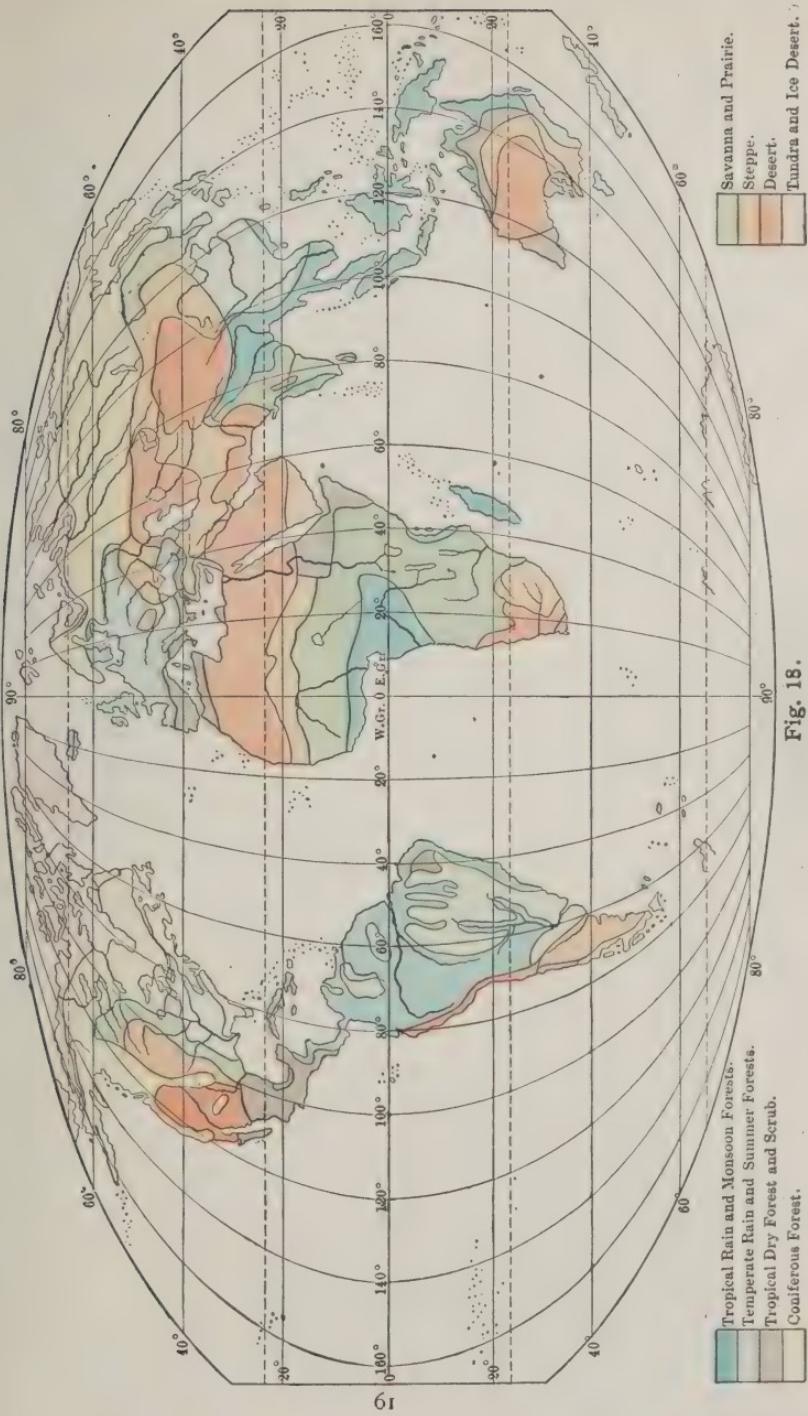


Fig. 16.

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relatively warm, damp, cloudy, and stormy weather and followed by cool, dry, clear weather. These changes occur as often as twice a week and are most marked in winter. Much of the activity and energy which characterize the inhabitants of these zones is probably due to the stimulation of frequent changes of temperature.

The vegetation of the intermediate zones is more varied than that of the cold temperate zones and includes both forest and grasslands, distributed according to the amount of rainfall.

The Steppes. — The coniferous forest of Asia and eastern Europe is bounded on the south by extensive treeless regions called steppes, where grasses flourish during the moist season. The steppe is a good home for herbivorous animals, provided they can move rapidly from dying or exhausted pastures to fresh ones, and can escape from their enemies. The steppes have been for ages the home and breeding ground of the hooved animals — asses, horses, cattle, sheep, goats, and camels.

Human life and economy on the Eurasian steppes have been described on pages 32-37.

In North America, east of the Rocky Mountains, a belt of steppe 300 to 500 miles wide extends from Texas to Alberta (Figs. 18, 19). It was originally the home of enormous herds of bisons, or buffaloes, which have been displaced by domestic cattle, imported from Europe and raised for meat and hides, and by sheep for wool.

In the southern hemisphere the *pampas* of Patagonia, the *veldt* of South Africa, and portions of the interior of Australia are steppe lands, given to the raising of cattle, sheep, and horses. Steppe lands are everywhere being invaded by farmers, who grow cereal grains by irrigation or "dry farming" methods. Steady streams of meat, hides, wool, and wheat which now pour from the steppes into the more densely populated regions have taken the place of the swarms of rodents, locusts, and wild men which in former times overflowed from the steppes into richer agricultural lands.

Summer Forest and Prairie. — Those portions of the temperate and cold temperate zones in which the annual rainfall is between

20 and 60 inches were originally occupied by summer forest and prairie (Figs. 17, 18). The largest of these areas cover:

1. Eastern North America south of the Laurentian lakes and river.
2. Central and western Europe, including central and southern Russia, Germany, Austria, France, and the British Isles.



FIG. 19.—Bunch-grass steppe, Nebraska. Notice the house on the horizon. (U. S. G. S.)

3. Northern China, Manchuria, Korea, and Japan. In central North America, southern Russia, and northeast Asia there are extensive *prairies*, or lands naturally covered with a dense, unbroken carpet of grass and herbs, with belts of trees along the streams occupying not more than twenty per cent of the area. The pampas of Argentina are grasslands which resemble both steppes and prairie and are used for either cattle raising or grain growing.

The summer forests are moderately dense and there is little undergrowth. The trees have broad leaves in summer and are bare in winter. Oaks and beeches are most numerous, but the maple, elm, walnut, chestnut,

hickory, ash, sycamore, poplar, linden, and many others are numerous and of large size. Most of these trees furnish hardwood timber, as valuable for making tools, furniture, vehicles, and machinery as the soft woods are for house construction.

Resources. — About seventy per cent of the lands originally forested have been cleared and, together with the grasslands, are among the richest food-producing regions in the world. The larger wild animals and nearly all the smaller ones injurious to human welfare have been exterminated and their places taken by domestic horses, cattle, swine, sheep, and poultry.

The winters are generally severe, but the summers are long, warm, and moist enough to ripen the cereal grains. During the growing season nearly as much energy is received from the sun daily as at the equator. In these regions scientific agriculture, combined with stock raising, has reached its highest development. Every year billions of bushels of corn, wheat, oats, rye, barley, and potatoes and millions of domestic animals are raised to feed the leading nations of the world. Later chapters will be devoted to a study of their economies.

The Subtropical or Warm Temperate Zones. — These have a temperate and a hot season. On the polar side the temperate season is the longer and on the equatorial side the hot season is the longer. There is no cold season, the temperature of the coldest month being above 50°, and frost is rare. The growing season lasts more than half the year. On account of inequality of rainfall, the vegetation of the subtropical zones varies from absolute desert to luxuriant evergreen forest.

Warm Deserts. — All the great deserts of the world occur in the subtropical zones. In northern Africa the great Sahara stretches across the continent and through Arabia and Persia to India. In North America, Nevada, Utah, Arizona, and portions of Oregon, New Mexico, California, Lower California, and Mexico suffer from desert conditions, modified by the recurrence of two moist seasons in the year. Along the coasts of Peru and Chile, a narrow, almost rainless belt extends for 2000 miles. In south-

ern Africa the Kalahari desert is larger than Nevada, and "the dead heart of Australia" is desert. Desert plateaus and basins, surrounded by mountains, occur in central Asia in the zone of cold winters. (See Fig. 18.)

Soils and Climate. — In warm deserts the most barren tracts are covered with drifting sand. Hard clay flats, sometimes with a crust of salt or soda, mark the beds of dried-up lakes. The soil may be rich in plant food, because there has been nothing to wash it out, but vegetation is sparse for lack of water. The rainfall is less than ten inches a year (Fig. 17) and in some places no rain falls for several years. The sky is clear and the sun's rays are so powerful by day as to raise the temperature far above 100° . At night the heat escapes rapidly through the clear air, and the temperature may fall to near freezing.

Desert Plants. —

Many species of plants are able to survive under these conditions, because they expose little surface for evaporation and have an extensive root system to absorb water. Desert plants have small, leathery leaves, and some, like the cactus, have no leaves at all. The skin is thick and gummy and much of their tissue is spongy for the storage of water. Their whole structure is adapted to get and store as much water as possible, and to keep what they get as long as possible (Fig. 20). In many places the desert is dotted more or less thickly with clumps of stunted, thorny bushes, with wide, bare spaces between. When a little rain falls, these plants put out leaves and flowers very quickly and ripen seed in a few weeks.

The oases, or fertile spots in the Sahara, are due to the presence of ground

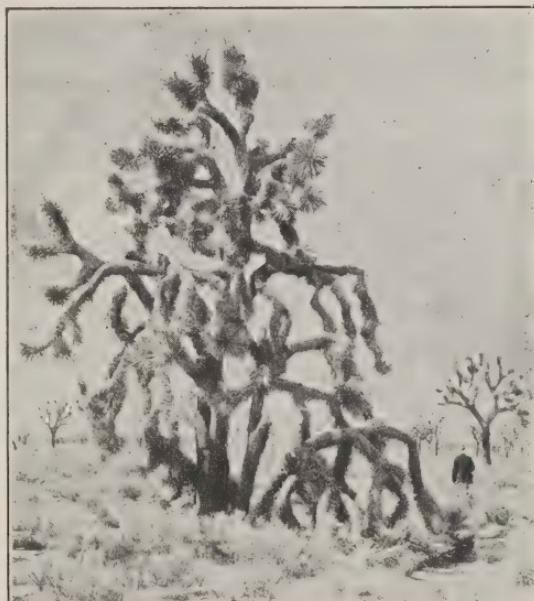


FIG. 20. — Desert vegetation, southern California.
Notice the bare spaces.

water within reach of plant roots; they produce date palms, grain, and other crops in abundance. In many places an artesian well will supply water enough to create an artificial oasis.

Animals and Men. — Animal and human life in the desert is very limited and uncertain. It is dependent upon ground water, sunlight, infrequent and irregular rains, and irrigation from streams which flow from neighboring rainy regions. The people of the Sahara and Arabia are nomads, wandering about with camels, asses, and horses to find pasture, and to trade with or rob neighboring peoples. The camel is "the ship of the desert," without which human life there would be almost impossible. His hoofs are padded with cushions which prevent his sinking in the sand, his nostrils are slits which he can close when the air is full of dust, and the storage cells of his stomach enable him to travel many days or even weeks without drinking. As a pack animal he can carry a load of 500 to 1000 pounds twenty miles a day. The species kept for riding will carry a man 200 miles in twenty-four hours.

Life in sedentary communities in a semi-desert is described on pages 22-26.

Resources. — The economic resources of the desert are necessarily limited, but not to be overlooked. Salt, soda, and borax are mined from the dry lake beds. Saltpeter and guano, so valuable as fertilizers, are found only where no rain falls to wash them away. Native desert plants produce fiber, rubber, and various gums. In oases and irrigated lands like the Nile valley, all the tropical products are grown, such as cotton, sugar cane, grapes, olives, dates, and other fruits, as well as corn, wheat, barley, and millet. Ostrich plumes and the famous Arabian breed of riding horses are desert products.

Tropical Dry Forests. — In the subtropical zones there are many areas where the rainfall is sufficient to support shrubs and small trees growing in clumps rather than in continuous forests. They all have small, leathery leaves and bear a general resemblance to desert plants, but are larger and more numerous.

They sometimes grow in thorny, scraggy, tangled thickets which are difficult to penetrate. The vegetation of a large part of the Mexican plateau is of this character.

Mediterranean Regions. — Some regions on the polar sides of the subtropical zones have twenty inches or more of rain in the year, but most of it falls in the autumn and winter, leaving the summers dry. The result is much the same as though the annual rainfall were less, and the vegetation is adapted to dry conditions. Of these regions the lands around the Mediterranean Sea are the most important.

Grass is scanty and poor, and sheep and goats are kept in preference to cattle. The trees have small, leathery, evergreen leaves and thick bark, like the oleander, often grown in the United States as a house plant. The most important are the cork oak, from the bark of which the cork of commerce is obtained, and the olive, the oil of which takes the place of meat and butter. Some regions are very favorable for the growing of tropical fruits, such as table, raisin, and wine grapes, figs, oranges, lemons, pomegranates, and dates. Mulberry trees are grown for their leaves upon which silkworms are fed (Fig. 21). Corn and wheat are raised in the cool, moist season or by means of irrigation. Many nut-bearing trees are profitable for human food and for feeding swine. The climate, vegetation, and products of southern California are essentially the same as those of the Mediterranean region. Small areas at the southern extremity of Africa and the southwestern point of Australia enjoy similar conditions.

Temperate Rain Forests. — Some parts of the subtropical zones have no dry or cold season, but are not excessively warm or wet. They are naturally occupied by broad-leaved, evergreen forests, much like those along the equator but less dense.



FIG. 21.—Mulberry leaves, silkworms, cocoon, and moth.

Southern China and the Gulf states of the United States are the most important (Fig. 18). They are productive of rice, sugar cane, cotton, and fruits, and in China of tobacco, indigo, mulberry, camphor, spices, drugs, and tea.

The Equatorial or Intertropical Zone. — The widest and largest zone of the earth covering nearly two fifths of its surface lies on both sides of the equator (Fig. 17). It includes the larger part of South America and Africa, Central America, India, farther India, the northern coast of Australia, the East and West Indies, and the swarming islands of the Pacific. On the lowlands the weather is always hot, the temperature of the coldest month being above 70° . The rainfall is very heavy except on plateaus and lands protected by mountains. The growing season is determined not by temperature but by rainfall. Near the equator rain falls almost every day in the year and there is no change of seasons; near the tropics, summer and winter differ chiefly in being one rainy and the other dry. This should be called the equatorial or intertropical zone, but is commonly referred to as the tropical regions or simply "the tropics."

Savannas. — Savannas are tropical grasslands which resemble the temperate steppes. Tall, stiff grasses in dense tufts are interspersed with low trees, scattered about or growing in belts along the streams. They occur on plateaus and lands partly protected from rain-bearing winds. The most extensive savannas in the world stretch across central Africa, almost from tropic to tropic (Fig. 18).

The African savanna is the home of immense numbers of large grass eaters, among which are the elephant, rhinoceros, hippopotamus, giraffe, zebra, and about one hundred species of antelopes. The abundance of game, including lions and leopards, is a hindrance to human occupation, but indicates the great possibilities of the country, when most of the wild animals are displaced by domestic animals, as has happened in America. Corn, millet, beans, bananas, sheep, goats, and cattle form the basis of subsistence for the native tribes. Ivory from elephants' tusks has been a source of great profit to traders, but the supply is rapidly diminishing.

The Dekkan plateau of India is in large part a savanna. Two or more crops a year are grown, rice or cotton in the hot, moist season and wheat in the cool, dry season. The country is so densely populated that in years when the monsoon rains are scant thousands of people die of starvation.

The southern *campos* of Brazil produce about three fourths of the world's supply of coffee and its cultivation might be extended.

Tropical Rain Forests. — The forest of equatorial South America has been described on pages 27-32. The forests of west equatorial Africa and the East Indies are of the same general character. The chief economic products now utilized are rubber, gutta percha, timber, and dyewood.

Civilized people are dependent upon the savannas and cleared lands of the tropics for a very long list of products which contribute to their comfort, pleasure, and health. Those most extensively used are sugar, coffee, tea, chocolate, coconut, spices, and fruits. Sago, palm oil, quinine, and many gums, perfumes, and drugs are strictly tropical products. On tropical lowlands rice is grown in quantities which rival those of any other cereal grain. It forms the breadstuff and principal food of one half the human species.

Summary. — The heat belts or zones of temperature are bounded by lines which show the average temperature of the hottest and the coldest month (January and July). Temperatures below 50° are too low for vigorous plant growth and are called *cold*, temperatures above 70° are called *hot*, and temperatures between 50° and 70° are called *temperate*. There are five zones which differ in the length of their cold, hot, and temperate seasons, and these differences determine the general character of the plants which may grow there. Each zone extends around the earth across lands which vary in size, position, relief, and soil. The kinds of forest, grassland, or desert which actually exist in different parts of any zone depend upon the amount and season of rainfall. The agricultural crops possible in any region, as well as the natural plant resources, are limited by the amount of available water in the soil.

QUESTIONS

1. Why are the usual torrid, temperate, and frigid zones, bounded by the tropics and polar circles, unsatisfactory as zones of temperature? (See Fig. 17.)
2. Why is the climate of the lands in the so-called temperate zones really intemperate?
3. Why is the vegetation different in different parts of the same zone? (See Fig. 18.)
4. What is the difference between a steppe and a prairie?
5. Why were not the Indians of the North American steppe herdsmen?
6. Why do the temperature and rainfall of winter in the temperate zone have little effect upon crop growing? How do they affect stock raising?
7. What countries lie wholly or partly in the Mediterranean region?
8. Why is not tea an important crop in the United States?
9. Why are there no savannas in Europe and only small patches in North America?
10. Which are of greater value to mankind, temperate products or tropical products?

CHAPTER VI

MINERAL AND MARINE RESOURCES

SOME natural resources have little or no relation to plants and are distributed independently of plant regions. Most of them are minerals obtained from the earth crust. The sea also furnishes many products, both mineral and animal, among which salt and fish are the most important.

Air and Water. — The most widely distributed of all minerals are air and water. The outer shell of the earth, hundreds of miles in thickness, is composed of air. It covers land and sea and penetrates both to great depths. About one fifth of the lower air is oxygen, a constant supply of which is necessary to animal life. Without it, the higher animals, including men, can live but a few minutes. Plants require oxygen for growth, and also derive about three fourths of their bulk from the small proportion (0.03 per cent) of carbon dioxide in the air. About three fourths of the air is nitrogen, a minute per cent of which becomes fixed in the soil and supplies food which neither plants nor animals can live without. Water vapor is everywhere present in the air and from it is derived the whole supply of water on land. The air contains many impurities in the form of dust made up of mineral particles, smoke, and minute plants or germs, some of which are favorable and some fatal to human life.

The waters of the seas, lakes, and rivers cover more than three fourths of the earth crust. The ground water penetrates the crust to great depths, connects the oceans from shore to shore, and thus completes an unbroken sheet of water around the globe. Land plants depend directly upon ground water, and land animals directly upon fresh surface water for food. The water in the ground is the source of more wealth than all minerals mined, not excepting coal, iron, gold, and silver.

Rocks. — The solid earth crust is made up of rocks of many kinds. On the surface the rocks have been broken up by air, water, and frost into a

layer of loose, incoherent fragments, called *mantle rock* (Fig. 22). From this mantle, soils are derived, consisting mainly of clay, sand, and gravel. Next

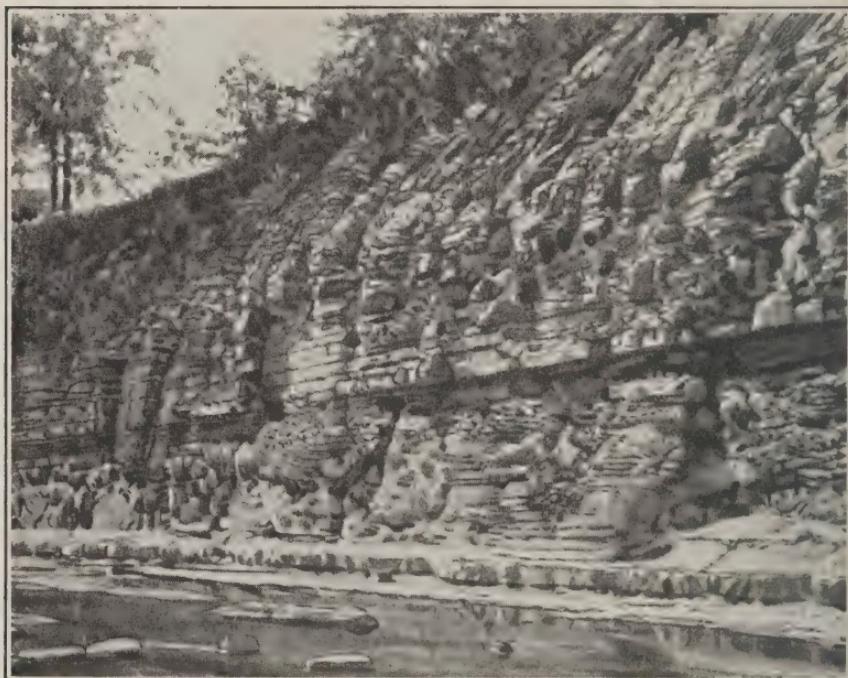


FIG. 22.—Mantle rock overlying stratified bedrock.

to air and water, soil is the most widely distributed of mineral resources. Not only does all land life depend upon mantle rock, but its materials are used for many purposes, such as clay for brick, tile, and pottery, sand for mortar and glass, and gravel for concrete and road metal. Limestone, sandstone, granite, and many other kinds of rock are quarried for buildings, bridges, and walls. Limestone is most widely used, both in its natural state and after burning for quicklime, from which mortar and plaster are made.

Coal. — The most valuable bedrocks in the world are the beds of coal. Millions of years ago vegetable matter accumulated in swamps and was buried under loads of mud. By pressure and heat it has been converted into mineral coal. When burned, coal produces so much heat that it is used wherever obtainable

for making steam to run engines and machinery. There is coal in Greenland and near the tropics in India, Australia, and Africa, but the great coal fields of the world are in the north temperate and cold temperate zones, in the United States and Canada, in western and central Europe, and in China and Japan (Figs. 23, 24). This adds greatly to the resources of the summer forest and grasslands where agriculture flourishes. These coun-

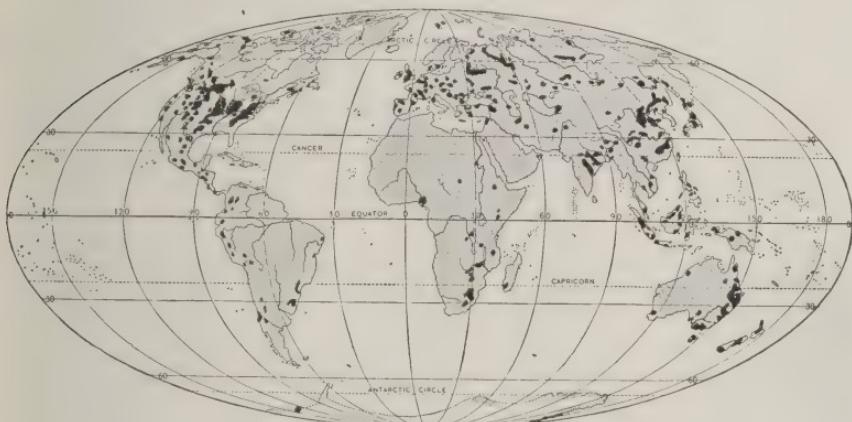


FIG. 23.—Distribution of coal.

tries have the raw materials and power for manufactures and the means of transportation for home and foreign trade; they display the most intense economic activity in every line, produce enormous wealth, and are the homes of the leading people of the world.

Petroleum.—Another mineral, second only to coal in value as fuel, is petroleum. It is abundant in the United States, southeastern Russia, Mexico, and Persia. The crude oil obtained directly from wells is used for generating steam in engines, as a "binder" in paving, and for keeping down dust on wagon roads. The greater part is refined and split up into numerous products: *kerosene* is used nearly the world over in lamps for lighting, *gasoline* for the engines of automobiles and launches, and heavier oils for lubricating machinery.

Metallic Ores. — The metal-bearing rocks generally occur in thin veins or streaks, filling what were once cracks in the earth crust. Such veins are most common in mountainous regions where the crust has been broken, and in lands worn down by erosion until rocks once deeply buried are exposed at the



FIG. 24.—A coal seam eight feet thick in a West Virginia mine.

surface. Hence metals are often mined in regions which are worthless for agriculture, thinly inhabited, and difficult of access. The native rock or ore is reached by shafts and tunnels, mined by drilling and blasting, and transported long distances, sometimes thousands of miles, to a furnace or smelter. There by means of coal the metal is extracted, purified, and made ready for use.

Iron. — Of all metals, the most useful and valuable to man is iron (Fig. 25). The ore is plentiful and widely distributed, but the cost of extraction is rather high, owing to the very high tem-

perature required. The first use of iron for tools and cutting instruments laid the foundation of civilization, and its present use for machinery, vehicles, railroads, bridges, and large buildings makes our era the age of steel. The wealth, power, and rank of any nation may be measured by the quantity of coal and iron used. Graded by this standard, the United States, Germany, Great Britain, and France lead the world.

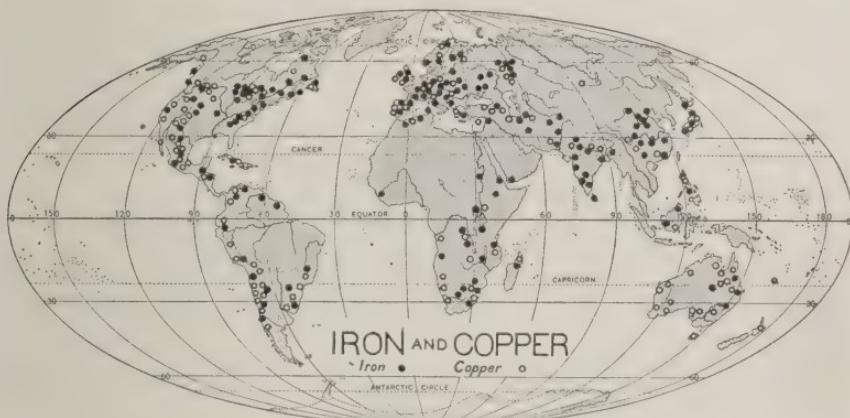


FIG. 25.—Distribution of iron and copper.

Copper.—Next to iron among metals, copper plays the most important part in modern industry (Fig. 25). This is due to the fact that it is a good conductor of electricity and enters into the construction of all electrical apparatus. Copper makes possible the telegraph, telephone, electric light, electric railway, and the distribution of power from a waterfall or central station over a large area. More copper is mined in Arizona and Montana than in all the rest of the world.

Lead, Zinc, Tin, Aluminum, Nickel, and other metals fill less important places in the arts than iron and copper, but for many purposes they could hardly be dispensed with.

Gold and Silver.—The precious metals have always been highly prized for their color, brightness, and durability, which

make them suitable for ornaments, jewelry, and tableware. Their general use as a standard by which to measure the value of all other commodities and for coinage into money, makes them an essential part of the economy of all civilized peoples. During the last half century, their production has enormously increased, and in consequence the value of silver has declined about one half. The trade of the world has grown with the amount of gold in use as money, and gold has declined little, if any, in value. South Africa, western United States, and Australia lead in the mining of gold, and Mexico and western United States in the mining of silver (Fig. 26).

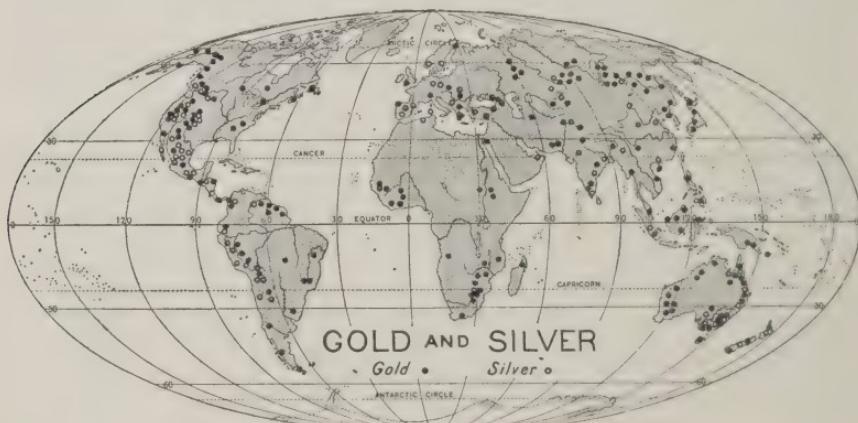


FIG. 26.—Distribution of gold and silver.

Fertilizers.—Of more real value to man than gold, silver, and diamonds are materials from which fertilizers can be made for feeding plants (p. 51). If crops are grown and removed from the land for many years, the soil becomes "worn-out" and the yield diminishes unless food for plants is in some way restored. The plant foods first exhausted are phosphorus, potash, and nitrogen, and artificial fertilizers generally contain these elements. The factories use animal waste whenever it can be obtained, refuse from slaughterhouses and fish canneries, bird guano from

oceanic islands, and marine fish, like the menhaden, which are too bony and oily for human food. But these are insufficient, and a last resort must be had to mineral resources.

Phosphorus exists on the earth in very small quantities and is most concentrated in the bones of animals. The remains of myriads of animals, buried ages ago in the mud at the bottom of the sea, have been changed into phosphate rock and raised above sea level. Extensive beds of this rock are mined in Florida and Tennessee, and larger deposits have been found near Yellowstone Park.

Potash is plentiful in the rocks of the earth crust but difficult to extract. The world's main dependence has been upon mines of potash salts at Stassfurt, Germany. Kelp, a seaweed which grows in inexhaustible quantities off the coast of California, is rich in potash, yielding fifteen tons per acre.

Nitrogen, forming about three fourths of the air, is one of the most abundant of plant foods, but is the most expensive to get hold of and deal with. Although plants are bathed in an ocean of free nitrogen, they can make little use of it. An electric discharge through air causes some of the nitrogen to combine with oxygen, and the gas formed can be caught and held by lime. In Norway water power is used to generate electric current by which nitrate of lime is now made from air and sold for fertilizer. The chief commercial supply of nitrogen has been from natural beds of nitrate of soda in the desert of Chile.

Other Minerals. — There are many other minerals in common use, of which salt, obtained from sea water, from wells, and from mines, is the most important.

Fisheries. — The animals of the sea form no exception to the law that animal life is everywhere dependent upon plant life, but their relations are complex and not so easily understood as the dependence of cattle upon grass. The term *fisheries*, as commonly used, includes the taking not only of fish, but also

of seals, whales, lobsters, oysters, pearls, sponges, and other ocean products. The most productive fisheries are found in the cool waters of the northern hemisphere (Fig. 27). From the shallow waters off the Atlantic coast from Cape Cod to Labrador, cod and mackerel are taken in immense quantities; salmon on the Pacific coast from California to Alaska; cod, herring, and halibut off the coast of Norway; sole, haddock, cod, turbot, and mackerel in the North Sea; salmon, cod, and

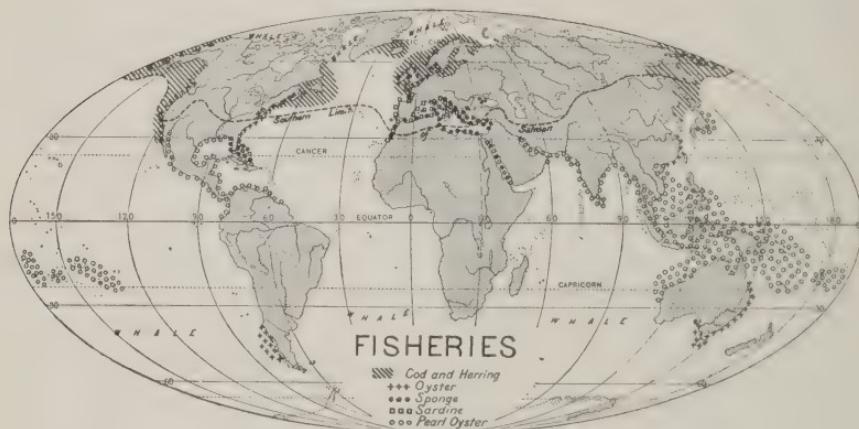


FIG. 27.—Distribution of fisheries.

herring around Japan; sardines, anchovies, and tunnies in the Mediterranean; and oysters in Long Island Sound and Chesapeake Bay. Seals and whales, hunted chiefly for their oil, are found around Labrador and Greenland, and in the North Pacific, Arctic, and Antarctic waters. From inland waters the whitefish and trout of the Laurentian lakes and the sturgeon of the Volga River and Caspian Sea are the most important.

Summary.—Air, water, rocks, metals, petroleum, gas, salt, and other mineral resources, necessary to life itself or to the best ways of living, are obtained from the atmosphere, from the sea, and from the solid crust of the earth. The sea and inland

waters also contribute richly to the income of the human family. Mineral and marine resources differ from nearly all others in having little or no relation to climate.

QUESTIONS

1. Suppose all the metallic iron in the world to disappear suddenly by magic. What would be the immediate effects upon your family and community? upon your state or country? finally upon mankind?
2. For what are lead, zinc, tin, aluminum, and nickel used?
3. Why are fish of more importance in England and New England than in Iowa or Colorado?
4. Why is gold worth more per ounce than copper? silver than tin?
5. What is meant by the stone age? the age of bronze? the age of iron? the golden age?

CHAPTER VII

INDUSTRY AND TRADE

ANY sort of productive work is an industry, but the word has come to be used especially for mechanical and manufacturing business on a large scale, as distinguished from agriculture.

Domestic Industry. — Formerly every household made at home whatever articles it needed, out of such materials as could be had, and literally *by hand*. Generally such articles are costly in time and labor and not of the best quality. Yet they may be so good as to make the terms *homemade* and *handmade* imply superior excellence. Among the early settlers and pioneers of America, each family was nearly self-supporting, producing at home from its own resources most of whatever food, clothing, housing, and conveniences it had. Little was carried to market and “boughten” articles were regarded as luxuries. Under such a system nobody could produce much surplus to sell and buy with. The only possible development or improvement was a division of labor, by which one man or household raised grain and animals, another tanned hides, another made shoes, another ground grain, another worked in iron, another built houses, another spun wool or flax and wove cloth, and another made garments. Thus arose the fundamental trades of farmer, tanner, shoemaker, miller, blacksmith, carpenter, mason, weaver, and tailor. When their products were exchanged it was found that the wants of every household could be supplied more fully and cheaply than when each tried to do everything. The work was still done mainly by hand and at home.

The Industrial Revolution. — The invention of the steam engine in the latter part of the eighteenth century revolutionized human industry by open-

ing to mankind enormous stores of power from burning wood or coal. This stimulated the invention of machinery designed to do on a large scale what men had been doing by hand on a small scale. A spinning jenny and a power loom could produce from wool or cotton more cloth in a day than a hundred men could turn out by hand in a year. In consequence cloth became so much cheaper and the use of it so much increased, that many times as many persons as before were employed in spinning and weaving, and people were better clothed. A similar change occurred in all industries and is still in progress. Now almost the only articles which are made by hand and are not machine-made are works of art.

The Factory System. — The advent of machinery almost did away with domestic manufacture. Machines must be placed in large buildings where they can be run by a single engine. The raw materials to be manufactured must be brought to the machines, and a large number of operators must be employed to tend the machines. All this requires the expenditure of large sums of money. Thus sprang up the factory system, maintained by capitalists, who build the buildings, install the machinery, furnish raw material, hire the workman for wages, and sell the product. The location of a successful industry is determined by many conditions:

1. A supply of raw materials to be manufactured.
2. Capital, or money to construct buildings, to buy machinery and materials, and to pay wages.
3. Power to run the machinery, usually derived from coal or water power.
4. A supply of labor, or a sufficient number of workmen to run the factory.
5. Housing, food, clothing, and other necessities and comforts for the workmen and their families.
6. A market in which to sell the manufactured goods.
7. Cheap transportation for materials and goods.

The existence in some degree of all these conditions in one locality or region is likely to make it a manufacturing site, town, or country. The presence of coal or water power seems to be the most potent single factor.

Water power made New England the first manufacturing district of the United States; it now makes factories cluster around Niagara Falls and is likely to make Norway a manufacturing country in the future. Coal makes the Pittsburgh district the center of the American iron industry and Great Britain the greatest manufacturing country in the world.

Foodstuffs. — Of all natural resources foodstuffs require the least elaboration. Fruits, nuts, and vegetables may be eaten fresh, roots and grains with little preparation except cooking. Meats and fish are eaten fresh, but are also dried, salted, smoked, canned, or otherwise preserved on a large scale. The great industries dealing with foodstuffs are canning, milling, baking, meat packing, and the manufacture of butter, cheese, and condensed milk.

Clothing. — Among materials for clothing, furs are worn most nearly in their natural condition, but they are usually cured, dyed, and sewed. Hides are tanned into leather, from which shoes and gloves are made. The *textile* industry, or weaving of cotton, wool, silk, and linen into cloth is more complex than food preparation and assumes enormous proportions. This is done by machinery and demands little skill of the workmen. The cloth has then to be dyed and made into garments, largely by handwork, which, in the case of fine clothing, dress-making, and millinery, may demand a high grade of artistic skill.

Constructive Materials. — In the utilization of materials for construction, woodworking is the simplest and easiest industry. Trees are felled by hand, but the sawing, planing, and shaping of timber into lumber, implements, vehicles, and furniture are done by machinery on a large scale. Fine carpentry, cabinet work, and wood carving furnish a field for the exercise of skill and artistic ability.

Minerals are more difficult to work than wood and their use in great variety is a late event in human history. The simplest and most primitive mineral industries are the making of adobe, or sun-dried brick, for houses, and the piling up of loose stones into walls. At present bricks are burned, and building stone is

quarried, sawed, hewn, carved, and polished. Fine clay is worked into pottery and chinaware, and sand into glass, each of which is material for high types of decorative art.

Metallurgy. — Few industries demand so much scientific knowledge as metallurgy. Few metals occur in nature in metallic form, and there is little in the appearance of an ore to suggest to the unlearned person that it contains a metal. The extraction and working of iron and other metals are now carried on by processes depending upon heat derived from coal, gas, or electricity, and involving the use of large capital and the most highly specialized scientific knowledge and technical skill.

Chemical Industries. — A group of industries dependent upon the progress of the science of chemistry has come into prominence during the last century. It includes the manufacture of petroleum products and gas for light, heat, and power, of acids, alcohols, ethers, and other solvents, of alkalies for soap and glass making, salts used in the arts and in medicine, drugs, dyes, paints, fertilizers, and thousands of articles in demand among all civilized people. The manufacture of common luxuries, such as tobacco, wines, beer, and distilled liquors, has assumed enormous proportions.

Intellectual and Æsthetic Industries. — The fullest development of human faculties involves the production and use of articles which minister directly or indirectly to intellectual needs and to the enjoyment of the beautiful in art. The commonest of such articles are paper, made from vegetable fiber (at present chiefly from wood pulp), inks, dyes, pigments, perfumes, and flavors. The printing of newspapers and books is one of the great industries of the world. The wall paper, rugs, and carpets, printed cloths, engravings, photographs, glass, china, silverware, and jewelry, found in nearly every household, owe much of their value to beauty. Even the production of paintings, sculpture, music, and literature may be classed among industries which minister to human wants and which are dependent in some degree upon material resources.

Trade. — It is difficult to imagine any community of men in which no one wants anything possessed by another. Trade is the redistribution of goods according to the various needs of different persons. In trade each party exchanges something which he wants less for something which he wants more, and the

exchange is to the advantage of both. Among primitive peoples trade consists of *barter*, or the direct exchange of articles or goods. One man has made several bows or pairs of moccasins, when he can use but one or two. Another man has killed several deer and has more venison and deerskins than he can use. An exchange of bows or moccasins for meat and hides makes both parties richer. As the number and variety of articles exchanged increase, the need for some standard by which values may be measured, and for some convenient medium of exchange is felt, and all goods are priced and paid for by one kind, usually the more highly valued.

White people in central Africa buy a sheep for one or more sticks of tobacco, or cattle for ten yards of calico per head. Among some tribes the regular price of a wife is thirty goats. Thus tobacco, calico, and goats are used as we use money. Among civilized people, gold, silver, and copper coins are found to be the most convenient form of money. They have a definite value which does not change much, and are made of different sizes and values to facilitate exact payment and "making change." Most of the world's great commerce is now carried on by means of paper representatives of money, such as government notes, bank bills, checks, and drafts, which are usually convertible into coin, if desired.

Commerce. — Among progressive peoples, primitive barter and local trade still persist, but have been far surpassed by domestic commerce involving the whole country and foreign commerce involving the whole world. Commerce grows out of the diversity of resources and products for which each zone and region of the earth is naturally adapted. Furs and fat come from the polar caps, furs and timber from the coniferous forests, meat and wool from the steppes, meat and grain from temperate forest and prairie, cotton, coffee, spices, and fruits from the tropics. Every community wants some share of all these goods, and commerce in them, especially between the tropics and the temperate zones, has been carried on by caravans and sailing vessels for centuries. The advent of the steam engine

enormously increased the amount and variety of products manufactured in the temperate zones. The use of steam power on railroads and ships makes possible a movement of goods along east-west lines exceeding in volume and value the commerce between different zones.

It has come to pass that the possession of coal, iron, and water power, with facilities for transportation by land and sea, enables any people to use whatever foodstuffs and raw materials they have, to buy whatever they want from any part of the earth, to sell surplus products, and to manufacture and sell any articles for which they find a market. Thus by foreign commerce, the environment of a community, or the territory from which the people get their living, is extended to include the whole world, and it may enjoy some share of all the world's goods. Each community produces those goods which it can produce to the best advantage, and buys abroad those goods for which other communities have better facilities. All production tends to be localized where it is cheapest, and the economic efficiency, wealth, and prosperity of mankind are increased. It is plain that world commerce can be carried on only by friendly intercourse and that it is a powerful influence in preserving peace among nations. Nothing conduces more to the general welfare of mankind than freedom and security of trade.

Summary. — By the division of labor, the use of steam and water power, the invention of machines, and the expansion of trade into world commerce, the available resources of the human family have been greatly increased. The environment of many communities has been extended over the whole face of the earth, and human life has become extremely rich and complex.

QUESTIONS

1. What domestic manufactures are carried on in your community?
2. Where do the materials used in these manufactures come from?
3. Where are the finished products marketed?
4. What articles used in your household have come from far distant regions?
5. If an extensive trade should be established between the Americans and the Chinese, what effect would it have upon the two peoples, beyond increasing their wealth?

HUMAN ECONOMIES

After Bartholomew

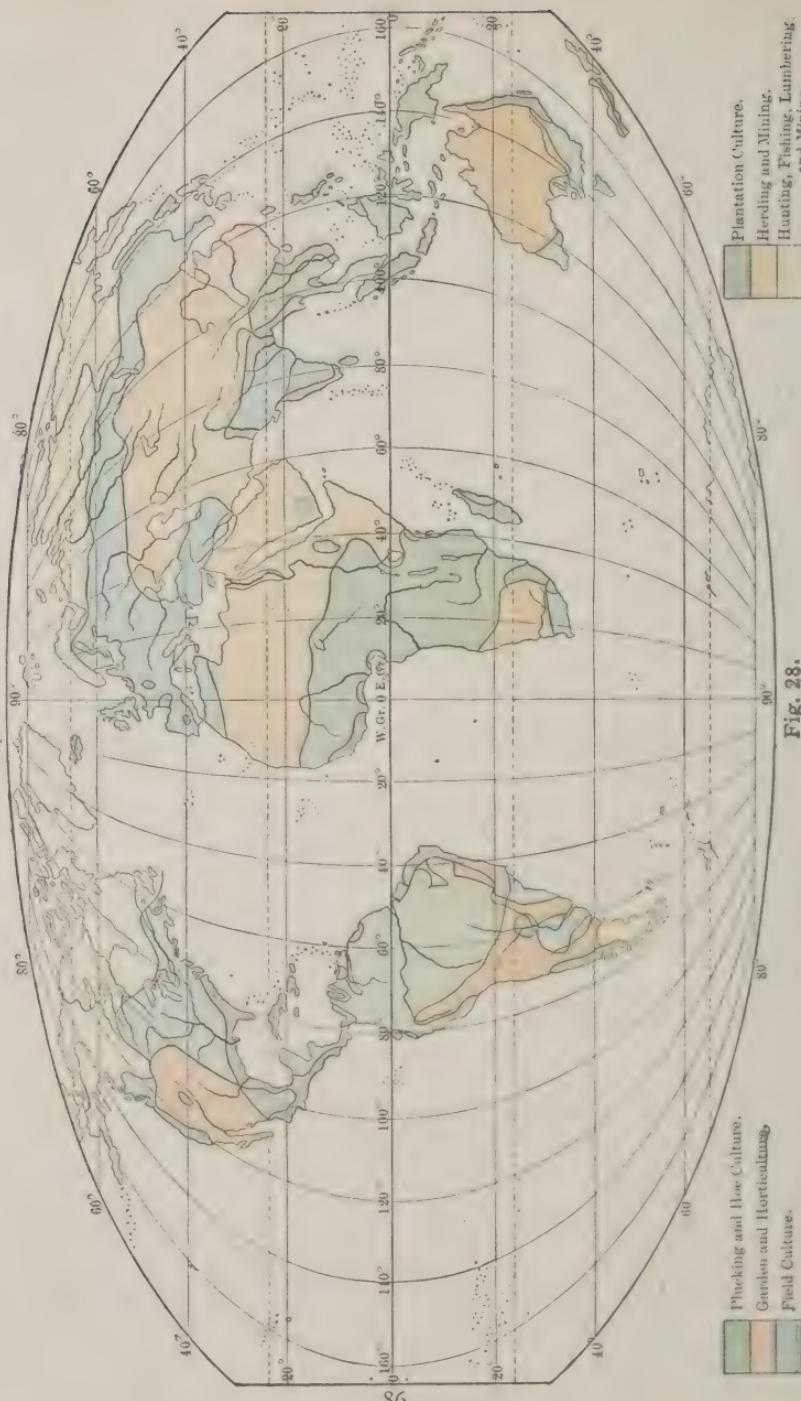


Fig. 28.

CHAPTER VIII

ECONOMIES AND ECONOMIC SOCIETIES

It is now possible to see how and why people make a living in so many different ways and to take a general view of all the different kinds of economy practiced by mankind in different parts of the world. (See Fig. 28.)

Collective Economies. — The simplest, crudest, and least effective way of getting a living is to pluck or gather whatever nature provides. This can hardly be depended upon outside the tropics, but in the equatorial zone, fruits, nuts, and roots mature spontaneously at all seasons of the year in such profusion that, with the addition of fish, a moderately dense population can get a living with little effort (p. 20).

Between the tropics and the poles a sparse population can support themselves by hunting and fishing. The Indians of eastern North America carried such economy to its highest efficiency without the use of metals, and developed perhaps the best type of manhood under such conditions. Yet the total population was less than that of one of our smaller states, and they were savages poorly clothed and housed and subject to frequent famine.

Collective economy in all its forms is purely destructive. It never increases but always decreases natural resources.

Agriculture. — The cultivation of plants secures a large and relatively constant food supply, enables people to live together in fixed and populous communities, and gives opportunity for the development of domestic arts, social and political institutions, and the refinements of civilization. Its simplest form is *hoe culture*, carried on usually by the women with rude implements and entirely by hand. It is often combined with fishing,

hunting, or herding. Hoe culture is most efficient in the equatorial or moist subtropical zones, but may be extended into temperate regions. It persists among advanced peoples in the form of *garden culture*.

Field Culture. — With the introduction of draft animals and corresponding implements, the average area cultivated by each farmer increases, and hoe culture passes into *field culture*, which prevails in the temperate zones. In new countries, like the United States, where land is plentiful and cheap, field culture is *extensive* and superficial. It is profitable for the farmer to cultivate a large tract imperfectly and to get a return, small per acre, but large in the aggregate. As population increases and land becomes more costly, agriculture becomes more *intensive*. Fields and farms grow smaller, but the yield per acre and the total return increase.

Special crops, such as celery, onions, sugar beets, tobacco, small fruits, and vegetables, are grown by garden culture in which some animal power is used. The most efficient agriculture, obtaining the largest possible returns from the land, must be some form of garden culture. Such economy prevails in China, Japan, India, Egypt, and portions of southern Europe, where labor is cheap and a dense population is supported. Which is more profitable anywhere, field or garden culture, is a question determined largely by the supply and the cost of labor. Field culture combined with stock raising is characteristic of the most highly civilized peoples.

Plantation Culture. — In the tropics certain crops are raised on plantations, or large tracts of land, generally owned by foreigners and worked by native labor under some sort of compulsion. Sugar cane, coffee, tea, cinchona, cacao, cotton, henequen, rubber, and fruits are thus grown. On account of the cost of machinery and the facilities for handling such products, it does not pay to raise them on a small scale, but natives of the tropics seldom have the skill, enterprise, or capital necessary to carry on the business. Slave labor, once common on plantations, has nearly disappeared.

Horticulture and Plant Breeding. — The growing of fruit-bearing shrubs and orchard trees, and the discovery and breeding of new and better varieties of grains, fruits, roots, and all domestic plants, are branches of scientific agriculture carried on with great energy and success among advanced peoples.

Herding. — The domestication of animals is a fundamental economy, second in importance only to agriculture. Herding makes good use of the most valuable resource of the steppes — grass; but without agriculture it can support only a sparse population. Scattered and wandering herdsmen can never enjoy the advantages of social intercourse essential to high civilization.

Stock Breeding. — In agricultural communities animals are kept to convert a part of the produce into meat, milk, and power. Coarse fodder unfit for human food, waste products, and many of the less palatable grains and roots are thus utilized, and the resources of the environment are made the most of. The improvement of breeds of domestic animals, as cattle for beef or milk, sheep for mutton or wool, horses for strength or speed, swine for rapid growth, and fowls for eggs, has attained a high degree of scientific advancement.

Scientific Collective Economy. — Collective economy is as essential to an advanced civilization as to the simplest life on a tropical island. Plucking wild fruits plays a trifling part, but lumbering, quarrying, and mining must be pursued on an expanding scale. These are collective economies because they are destructive inroads upon nature's capital laid up for human use. Except so far as forests may be planted and conserved, man can do nothing to increase the amount of timber, stone, coal, ore, or any mineral in existence. On the contrary, he is now consuming the natural supply at an enormous and increasing rate.

Perhaps, taking all the forests in the world into account, timber is growing faster than it is consumed; but there is no useful mineral the quantity of which is known to be increasing. Some, like clay and limestone, are

inexhaustible; some, like iron ore, will last an incalculably long time; some, like coal, can be used up in a few thousand years, or, like petroleum, in a few centuries. It is possible that the progress of scientific knowledge will discover new minerals which will take the place of some of those now in use and liable to be exhausted.

Scientific Manufacture¹ and Engineering. — The useful industries or mechanic arts are of recent origin and are practiced on a large scale only among advanced peoples. They are often called *technical* arts, from a Greek word meaning *to make*, because they deal with things that are made. They depend upon the use of machinery and are hence *mechanical*. They involve the exercise of human skill or ingenuity and are, therefore, branches of *engineering*. In some countries the number of people engaged in manufacture and engineering and the value of their products exceed the number and value belonging to all other occupations combined.

Commerce and the Professions. — In civilized communities there are large numbers of people who produce nothing at all visible or tangible, yet are busy and necessary to the community life. These include (1) merchants of all kinds, who buy and sell goods, (2) people engaged as carriers in transportation of passengers and freight, (3) bankers and brokers who deal in money and securities, (4) lawyers, physicians, ministers, teachers, journalists, authors, artists, and domestic servants, who render highly necessary and valuable services to every citizen.

An analysis and tabular view of human economies is given below :

HUMAN ECONOMIES

I. Collective.

- A. *Primitive.* 1. Plucking. 2. Fishing. 3. Hunting.
- B. *Scientific.* 1. Lumbering. 2. Mining. 3. Quarrying.

¹ *Manufacture* (making by hand) might well be displaced by a new word, *artifac-ture* (making by art). All manufactured goods are *artificial*.

II. Productive.

A. *Agriculture.* 1. Hoe culture. 2. Garden culture. 3. Field culture. 4. Plantation culture. 5. Horticulture. 6. Forestry. 7. Plant breeding.

B. *Animal Industry.* 1. Herding. 2. Stock breeding.

III. Constructive.

A. *Manufacture.* 1. Domestic. 2. Capitalistic.

B. *Building.*

C. *Engineering.* 1. Mechanical. 2. Chemical. 3. Architectural.

4. Electrical. 5. Hydraulic. 6. Naval. 7. Mining. 8. Military. 9. Civil.

10. Sanitary.

IV. Distributive.

A. *Commerce.*

B. *Finance.*

C. *Transportation.*

D. *Communication.*

V. Personal.

A. *Domestic Service.*

B. *Professional Service.* 1. Medicine. 2. Law. 3. Politics. 4. Education. 5. Literature. 6. Art. 7. Religion. 8. Army and Navy.

Economic Types. — The various communities or societies of men may be classified according to their prevailing economy and given a rank corresponding to the extent and efficiency with which they utilize the natural resources of the earth.

I. Simple Societies. — Societies which depend upon the resources of their immediate environment and are independent of foreign trade are *simple*. Their wants are few and their arts and industries are rudimentary. The resources of their environment are limited and imperfectly utilized. They are self-supporting and usually more or less nomadic. There are three types:

1. Societies which by plucking, fishing, and hunting use and destroy natural resources, producing nothing. They inhabit the cold deserts, tundras (Eskimos, p. 17), coniferous forests, and equatorial forests (Amazon people, p. 27).

2. Societies which produce food and clothing by hoe culture combined with collective economy or herding. They inhabit savannas, tropical islands

(South Sea Islanders, p. 19), and the margins of warm desert and forest (Pueblo Indians, p. 22).

3. Societies whose main resource is domestic animals. They inhabit steppes (people of the Steppe, p. 32), savannas, and tundras.

II. Complex Societies.—Societies which are partly self-supporting, but dependent upon other societies to supply a large part of their wants, are *complex*. Their wants are numerous and varied, and their arts, industries, and commerce are moderately to highly developed. Foreign trade is essential. Their own resources are exploited and sometimes fully utilized. They are dependent upon one another. They flourish in the temperate forest and grasslands, but extend their enterprises to all parts of the world. There are four types:

1. Societies which produce essentials, such as foodstuffs and raw materials at home and obtain very limited manufactured luxuries by trade. Their economies are chiefly productive. They feed themselves. Industry is almost wholly domestic. Foreign commerce per capita is small. The Chinese are the best example.

2. Societies which export a large part of their foodstuffs and raw materials, and import most of their manufactured goods. When agricultural, they have a large excess of rural over urban population. Their economies are chiefly productive and distributive. They feed others. Foreign commerce per capita is large. They are young and sparsely populated countries, often European colonies. Australia, New Zealand, South Africa, and Argentina are examples.

3. Societies which import most of their foodstuffs and raw materials, and export manufactures. Their economies are chiefly constructive and distributive. Capitalistic manufacture and foreign commerce are very large. They are fed by others. They depend chiefly on coal and iron and are very wealthy, but the sources of their wealth are exhaustible. The urban population greatly exceeds the rural. Great Britain and Belgium are examples.

4. Societies which export foodstuffs, raw materials, and manufactures, and import chiefly luxuries. They practice all economies, exploit all kinds of resources, and use all the arts of engineering. Trade and commerce are extensive and varied. Their economies are highly developed and harmoniously balanced. They feed and are fed. The rural and urban populations are nearly balanced. They might be independent but actually enjoy the resources and products of the world, and their wealth is capable of indefinite increase. The United States is the best example.

QUESTIONS

1. Make a list of all the different kinds of economy practiced in your community. Which are the most general and important?
2. In what economies is the largest number of people employed? Why?
3. Make a list of the names of some of the most prominent people engaged in each economy.
4. Which economies require large capital?
5. Which economies require superior education and ability?
6. By which economies is the greatest individual wealth accumulated? Why?

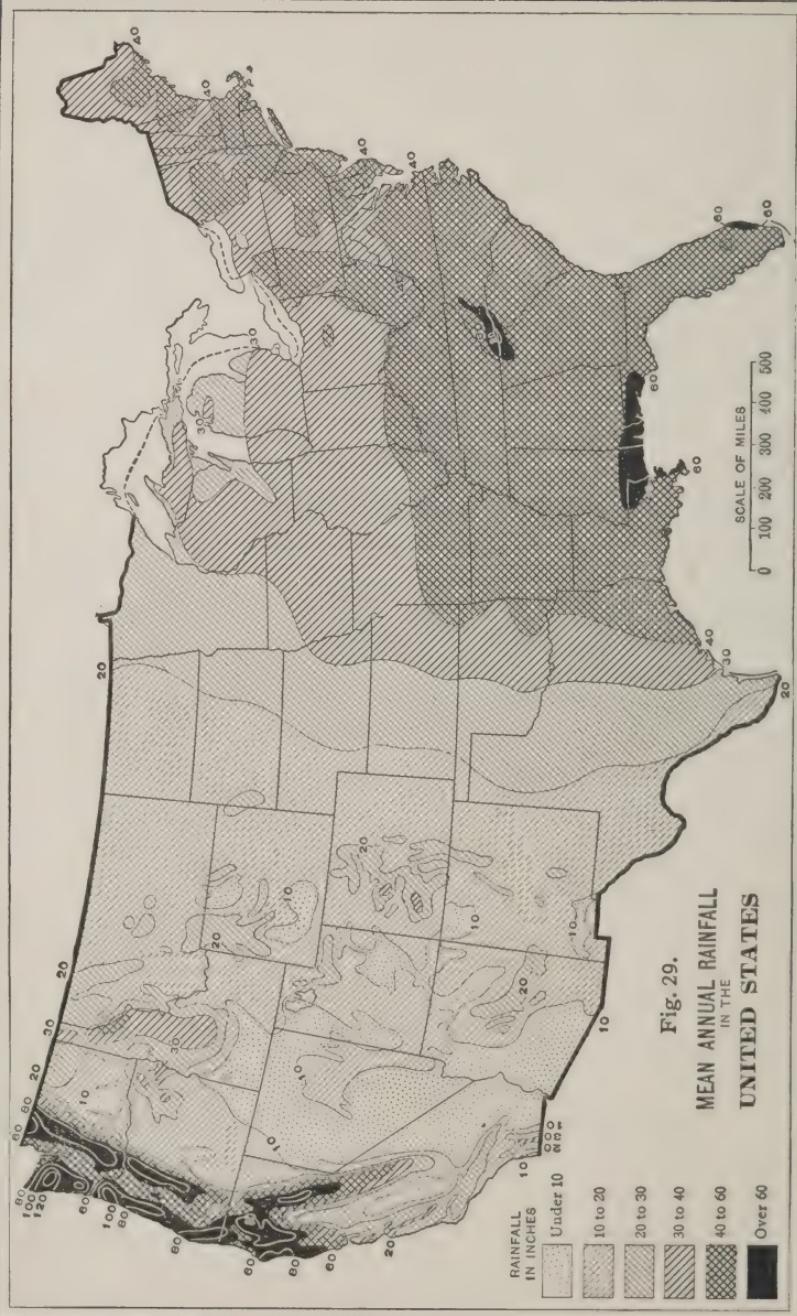


Fig. 29.
MEAN ANNUAL RAINFALL
IN THE
UNITED STATES

PART II

ECONOMIC GEOGRAPHY OF THE UNITED STATES

CHAPTER IX

NATURAL ECONOMIC REGIONS OF THE UNITED STATES

Location and Natural Conditions. — The continental territory of the United States spans the north temperate zone and extends into the cold temperate zone on the north and the subtropical zone on the south (Fig. 17). The main body of the states extends across North America from the Atlantic Ocean to the Pacific, a distance of about 2500 miles, and from the Great Lakes and the 49th parallel to the Rio Grande and the Gulf of Mexico, a distance of about 1200 miles. The area is about 3,000,000 square miles, or nearly as large as that of the continent of Europe. The position and size of the country are extremely advantageous. Occupying the middle latitudes of North America, it covers a large portion of the land area most suitable for civilization (pp. 50, 60, 64, 92, 93, Figs. 17, 18, 31, 32). Bordering upon two oceans, on the other side of which lie the populous countries of Europe and Asia, it can be neighborly with half the people of the world. It includes a great variety of relief, soil, climate, vegetation, and resources, and can produce nearly all kinds of wealth on a large scale.

Atlantic and Pacific Divisions. — The United States is naturally divided into two nearly equal, contrasted portions. The line of division is marked approximately by the 100th meridian. The eastern half may be called the low, humid states; the western half the high, dry states (Figs. 29, 33, 35).

The eastern or Atlantic division is a plain, broken only by

the Appalachian Highlands, of which only about 20,000 square miles lie more than 2000 feet above the sea. It is almost everywhere smooth enough to be tilled and traversed by roads and canals. Beneath the surface are found the most valuable coal

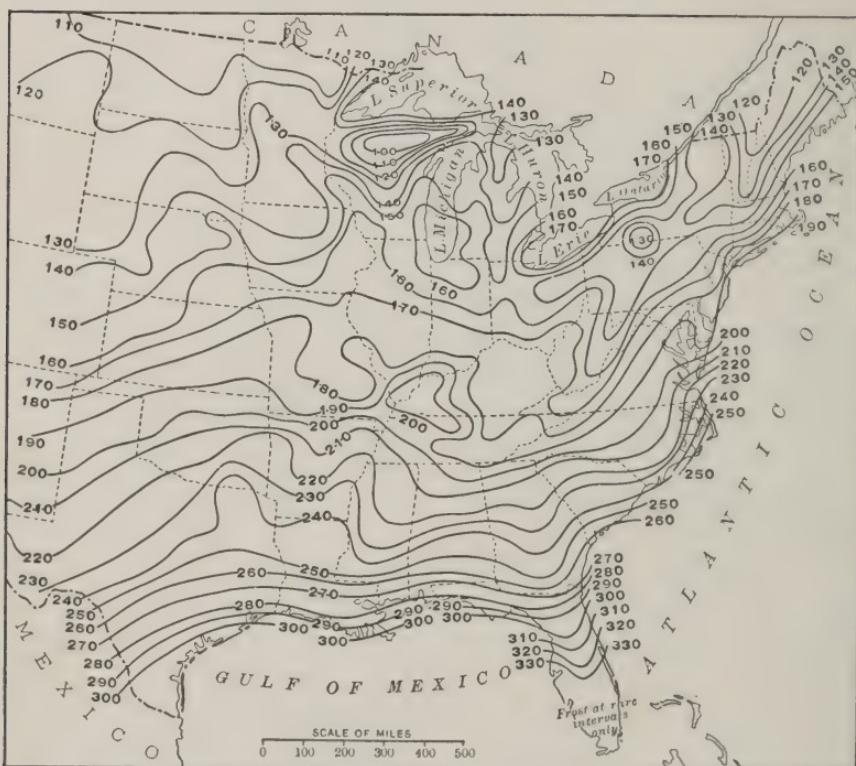


FIG. 30.—Average length in days of the growing season in the Atlantic division of the United States.

fields yet opened in the world, with important deposits of iron, lead, zinc, petroleum, and other minerals. In the rougher parts water power is abundant. One half the area is covered with the best glacial and alluvial soils. The rainfall varies from 20 inches in the northwest to 60 inches in the southeast (Fig. 29), and is everywhere sufficient in the growing season for agriculture without irrigation (Fig. 30).

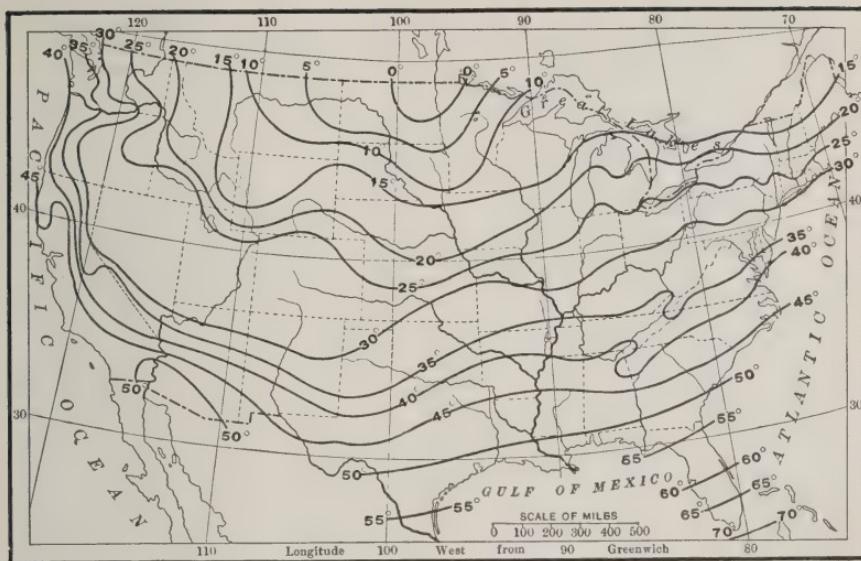


FIG. 31.—January isotherms.



FIG. 32.—July isotherms.



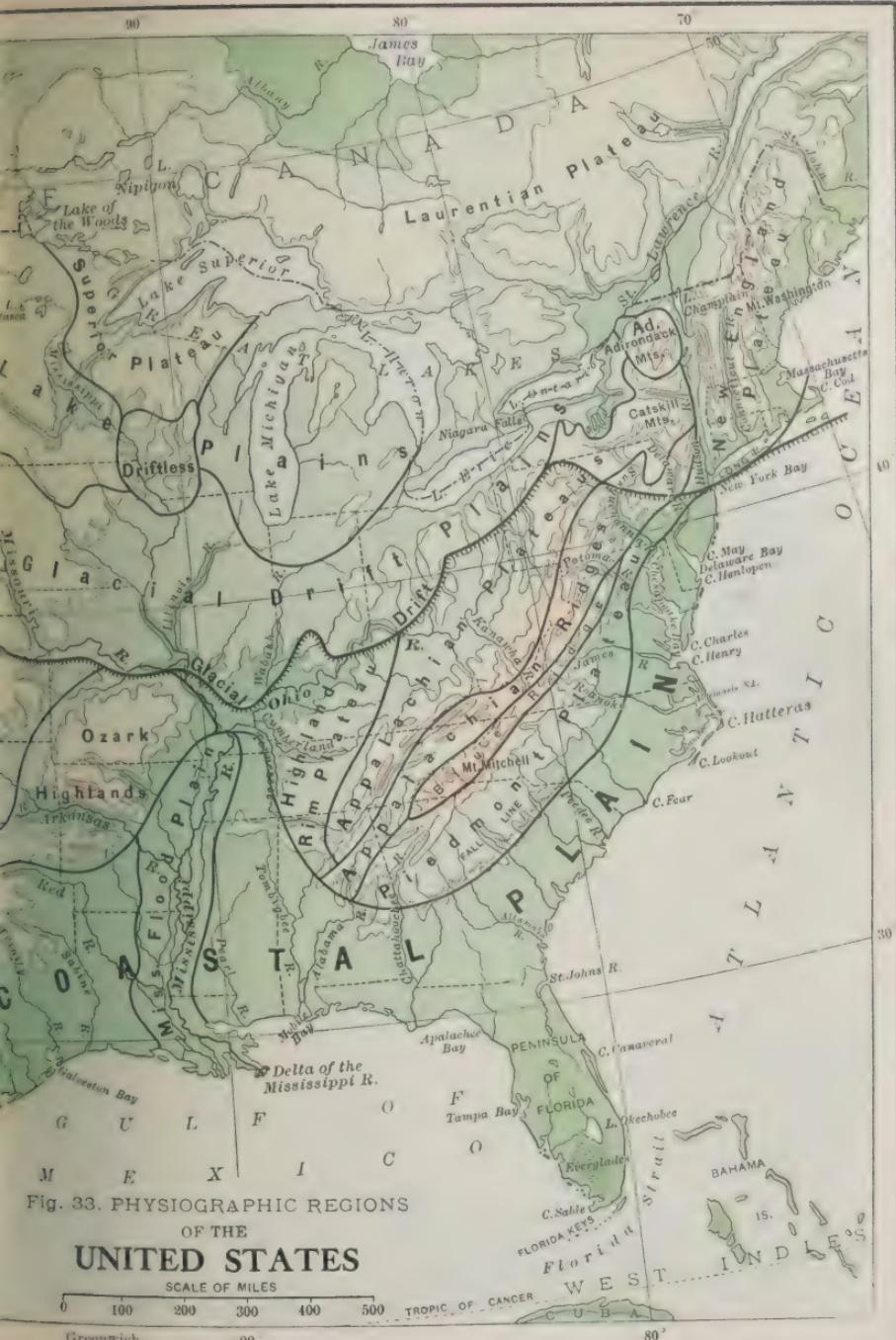


Fig. 33. PHYSIOGRAPHIC REGIONS
OF THE
UNITED STATES

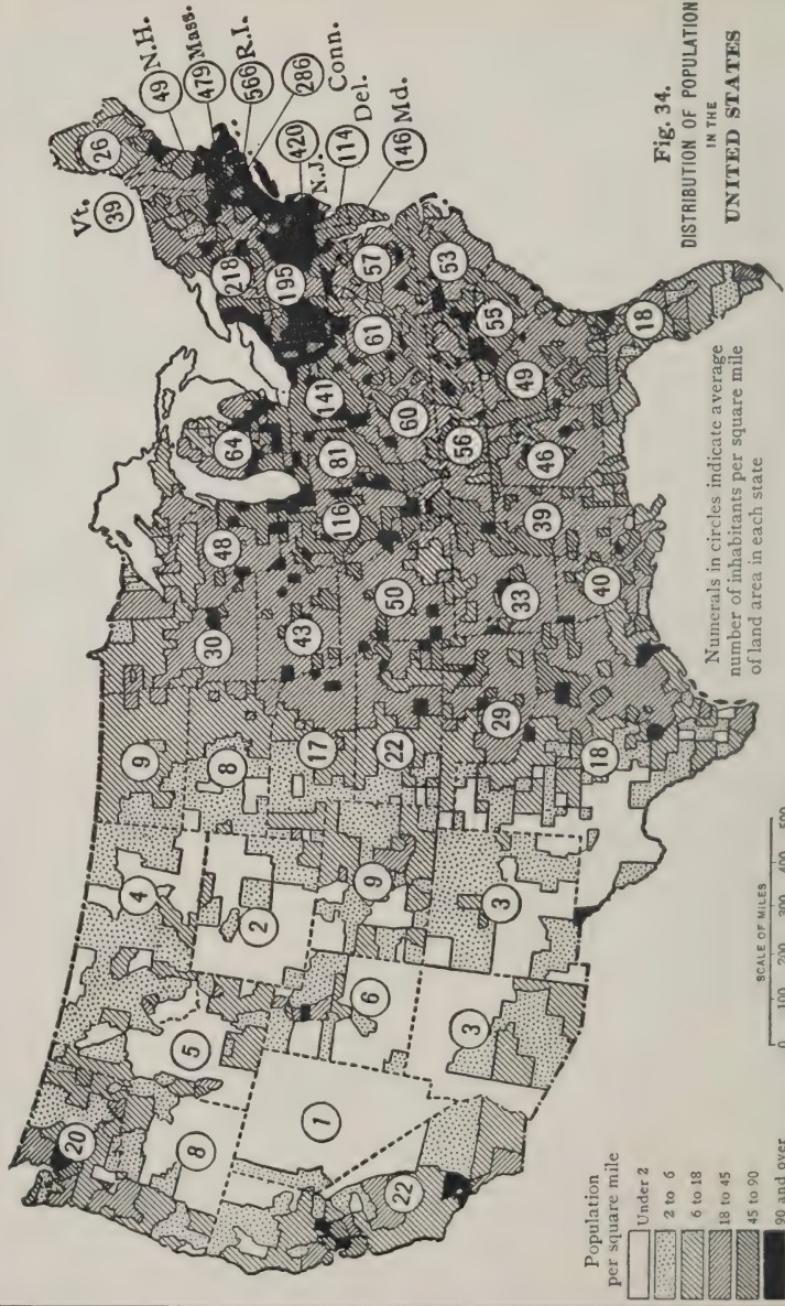
SCALE OF MILES

0 100 200 300

Greenwich 99

Greenwich 90

80



**DISTRIBUTION OF POPULATION
IN THE
UNITED STATES**

Numerals in circles indicate average number of inhabitants per square mile of land area in each state

Population
per square mile

A series of six vertical bars of increasing density from left to right, used as a grayscale calibration or noise reference.

SCALE OF MILES

The natural vegetation consists chiefly of summer forest and prairie, with smaller areas of coniferous forest in the north, on the highlands, and on sandy soils near the coast (Fig. 61). The Atlantic coast line is low and indented by many river valleys, which admit the sea far into the land, forming good harbors and ports. The coast faces the populous and highly civilized countries of Europe, which can be reached by a voyage of less than a week. Its southern boundary is the shore of "the American Mediterranean," where the waters of the Gulf of Mexico wash the tropical shores of the West Indies, Mexico, and Central and South America.

The western or Pacific division is a mountainous plateau, nine tenths of which lies above 2000 feet in height. It is crossed from north to south by the Cordilleras, consisting of the Rocky Mountain system near the eastern side, and the Cascade, Sierra Nevada, and Coast Ranges near the coast. The Great Plains east of the Rocky Mountains, and the lava plateau of Oregon, Washington, and Idaho are relatively smooth. The Colorado plateau is cut by profound canyons, and the Great Basin, ridged by scores of mountain ranges, resembles a washboard. The only extensive lowlands are the valleys of California, Puget Sound, and the lower Columbia and Colorado rivers. The mountains are rich in ores of gold, silver, copper, and lead, making this one of the great metal-producing regions of the world. The climate varies greatly with elevation but, except in the coastal region, is generally severe. The highest temperatures in North America occur in southern California, and the lowest in the United States in Montana. The rainfall is generally less than 20 inches and in the southwest less than 10 inches. On the mountains it reaches 30 inches and on the coast north of California 40 to 100 inches (Fig. 29). The coastal rains are heaviest in winter, and in California the summers are dry. (See Figs. 29, 31, 32, 33.)

The vegetation consists of dense coniferous forest on the mountains and wet lowlands (Fig. 61), steppe on the plateaus having 10 to 20 inches of rain, desert where the rainfall is less than 10 inches, and subtropical dry forest in the region of dry summers. The Pacific coast is high and rocky, with few harbors and only three large indentations, San Francisco Bay, the lower

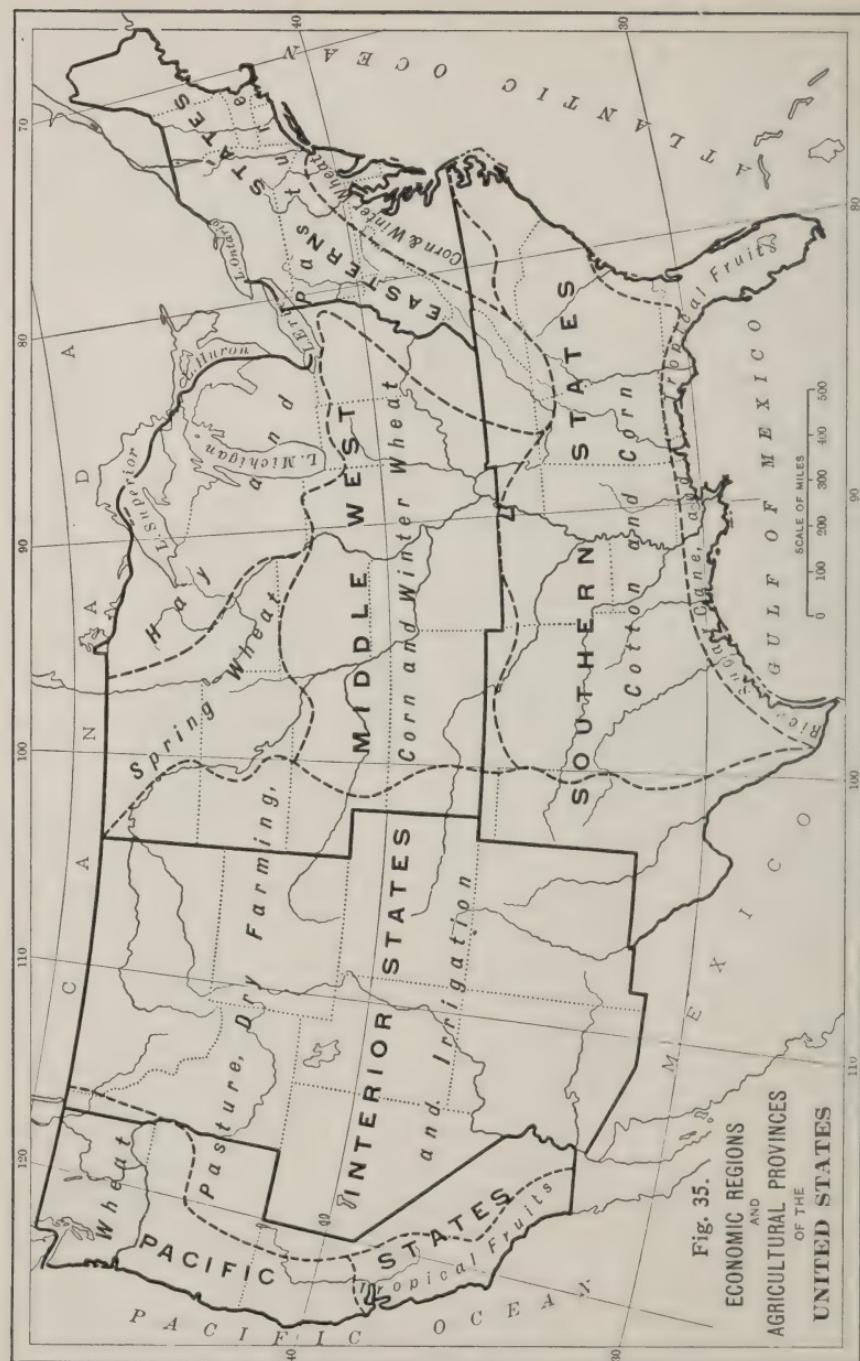


Fig. 35.
ECONOMIC REGIONS
AND
AGRICULTURAL PROVINCES
OF THE
UNITED STATES

Columbia River, and Puget Sound. The densely populated countries of China and Japan lie at a distance of 15 or 20 days' journey. A sail of 10 or 15 days more would take one to the East Indies, Australia, or New Zealand.

The relative economic value of the Atlantic and Pacific divisions is clearly shown in Fig. 34. The contrast between the density of population, or number of people which each division supports, is very striking. In the eastern half there are only a few patches where the density is less than 18 persons to the square mile. In the western half there are only a few patches where the density is more than 18 to the square mile.

Economic Regions.—Agriculture, stock raising, mining, manufacture, and trade are carried on to some extent in nearly every part of the United States, but there are regions in which some one of these economies assumes larger proportions than in any other. The leading crop or industry varies in different districts, and it is possible to subdivide the country into any desired number of economic divisions. This has been done as far as convenient for the purposes of this book on the map, Fig. 35. The boundaries are not really sharp and definite as the lines indicate. Usually no difference would be noticed by a person crossing any of them, but a gradual change would occur within some

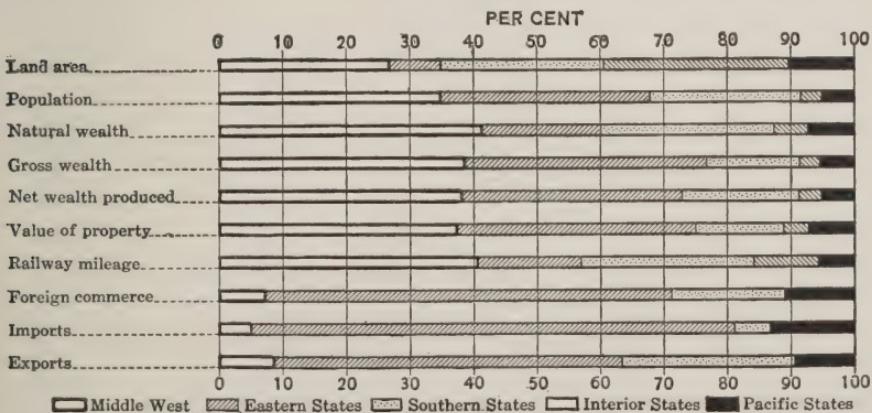


FIG. 36.—Rank of economic regions in area, population, wealth, and commerce. (See Table I, Appendix.)

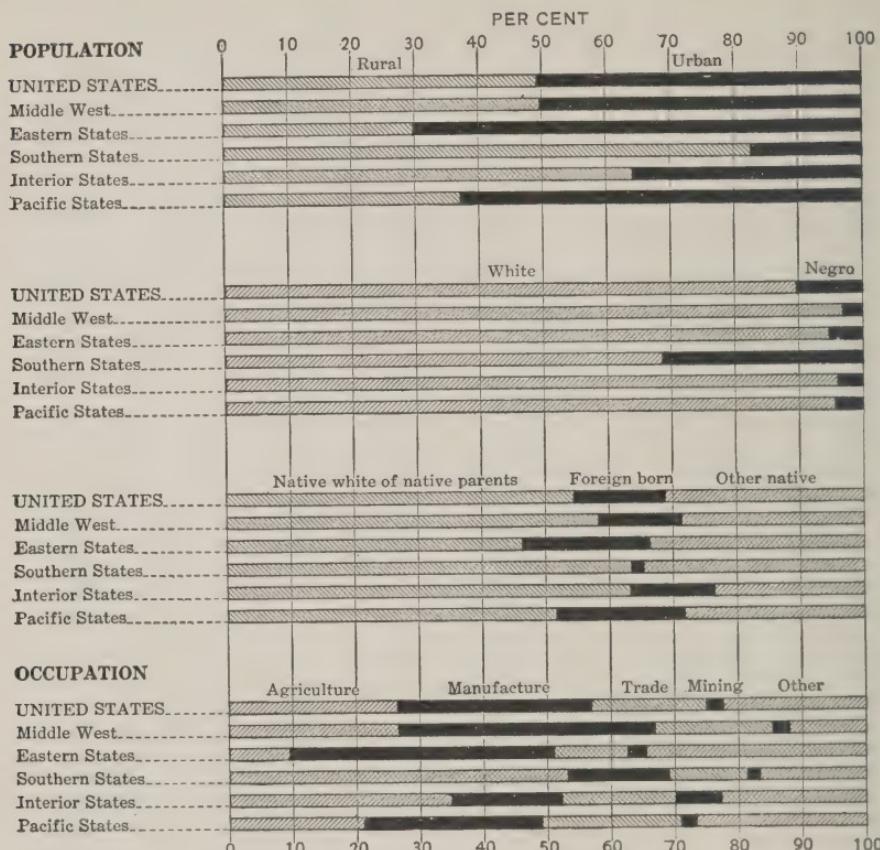


FIG. 37.—Rank of economic regions in population and occupations. (See Table II, Appendix.)

miles on either side of the line. The United States is a political unit, but in area and economic character the states differ among themselves as much as the countries of Europe. Economic boundaries do not always correspond with state lines, but each state may be treated as belonging to the region in which its most important economy would place it.

Summary. — The United States may be divided into natural regions, or groups of states, in each of which the general economic conditions are uniform and are different from those in other regions. (See Figs. 36, 37.)

QUESTIONS

1. What countries in the world are as large as the United States, or larger?
2. Do any of them have a long coast line on two oceans?
3. Is the relief of any as varied as that of the United States?
4. What countries lie in the same latitudes as the United States? in the same temperature zones? (See Fig. 17.)
5. What other countries have large areas of summer forest, coniferous forest, prairie, steppe, and desert? (See Fig. 18.)
6. What other countries have large coal fields? (See Fig. 23.) iron mines? copper mines? (See Fig. 25.) gold and silver mines? (See Fig. 26.) Has any other country all of these?
7. What and where is the smallest rainfall in the eastern half of the United States? (See Fig. 29.) What and where is the largest?
8. Why is the density of population greater in that part of the United States which has 20 inches or more rainfall? (See Figs. 29, 34.)
9. How does the density of population in that part of the United States which lies above 2000 feet compare with the density in the part below 2000 feet? (See Figs. 33, 34.)
10. How do you account for the density of population along much of the shore of both oceans and of the Great Lakes?

CHAPTER X

THE MIDDLE WEST: AGRICULTURE

THE region upon which the people of the United States depend chiefly for their food supply may be regarded as the foundation of their economy, and that is the Middle West. The natural boundary on the east is the Appalachian Highland and on the west the contour line¹ of 2000 feet, the limit of 20 inches of rainfall, and the margin of the steppe, all of which lie near the 100th meridian (Figs. 18, 29, 33). The natural southern boundary is indefinite, with a wide belt of gradual change to the conditions of the Southern States region, from which it may be separated by the limit of 7 months without frost (Fig. 30). On the north it extends to the Great Lakes and the Dominion of Canada. It includes the states of Ohio, Indiana, Kentucky, Illinois, Missouri, Iowa, Michigan, Wisconsin, Minnesota, Kansas, Nebraska, South Dakota, and North Dakota² (Figs. 35, 56). The western part of the last four states named forms a region of transition or gradual change to the conditions of the Interior States. The area of the Middle West is a little more than one fourth that of the United States and its population more than one third (Fig. 36). Chicago, the metropolis and commercial center, is equidistant (about 900 miles) from the Atlantic seaboard and the Gulf coast, and about twice as far from the Pacific coast.

¹ A contour line on a map represents a line on the ground which is everywhere at the same height above the sea, in this case 2000 feet.

² These correspond to the North Central States of the Census Bureau with the addition of Kentucky, which is a transition state excluded from the southern group because it raises no cotton.

Relief, Soil, and Drainage. — The Middle West includes lakes Michigan, Superior, Huron, and Erie, which form a great inland sea, connected both naturally and artificially with the ocean. The streams flowing into these lakes are short, and most of the region is drained by the upper Mississippi, Ohio, and Missouri rivers, which furnish a waterway to the Gulf of Mexico. Between North Dakota and Minnesota the Red River flows northward to Lake Winnipeg and Hudson Bay.

Two thirds of the land is covered with a heavy coat of glacial drift (Fig. 33), brought by successive ice sheets from the north. This mass of mantle rock was removed from its original position, thoroughly ground and mixed, and finally plastered over the bedrock surface, covering up most of its irregularities. The surface of the drift forms a smooth, level, or undulating plain, traversed by many gentle ridges and belts of low hills. It is very favorable for tillage and transportation, and the drift forms a soil of great depth and fertility. The unglaciated portion is rougher, and in southern Missouri and eastern Kentucky decidedly hilly and rugged. The lands around Lake Superior are traversed by ranges of rocky hills, rich in iron and copper.

Climate and Vegetation. — Cyclonic storms bring frequent and great changes of weather (p. 60). The winters are in most parts severe, but the summers are everywhere long and warm enough to ripen grain. The length of the growing season varies from four to seven months (Fig. 30). The rainfall ranges from 50 inches in the southeast to 18 inches in the northwest. In the drier parts most of the rain falls in the growing season and there is moisture enough for farming without irrigation. The belt of coniferous forest (Fig. 18) extends into northern Michigan, Wisconsin, and Minnesota. Ohio, Indiana, Kentucky, and southern Michigan originally supported a heavy growth of hardwood timber. West of Indiana and Lake Michigan trees were few, and generally confined to belts along the streams (Fig. 61). This is the region of the great prairies, the richest grasslands in the world.

Agriculture. — In nearly every part of the Middle West, the relief, soil, and climate are extremely favorable for field culture.

During the last century all except the poorest and roughest lands have been brought under cultivation. This required the removal of a large part



FIG. 38. — Gang plow drawn by an engine on the level prairie.

of the forest, itself a work of great labor. The prairies were already clear and ready for the plow (Fig. 38), but lacked materials for construction. A population large enough to occupy and till the land could not reach it, or be supported by it, without means of transportation for people and goods, and without access to markets. These means were supplied at first by the Ohio, Mississippi, and Missouri rivers and their tributaries, later by canals, railroads, and the Great Lakes.

The proportion of improved land under cultivation for crops and pasture is as high as 82 per cent in Iowa, above 76 per cent in Illinois, over 70 per cent in Indiana and Ohio, nearly 60 per cent in Kansas, and 34 per cent for the whole region, which includes 54 per cent of all the improved lands of the United States (Fig. 39). The products are nearly all foodstuffs. They include all the grains, fruits, and vegetables of the temperate

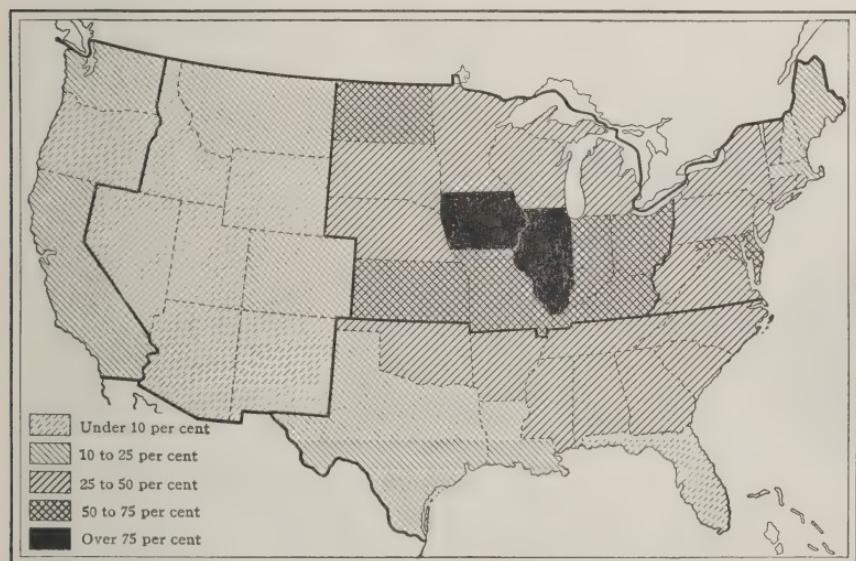


Fig. 39.—Proportion of improved land in farms to total land area, 1920.

zone, but the principal crops are corn, wheat, oats, and hay. Stock raising is an essential part of the economy and much of the plant growth is converted into pork, beef, mutton, dairy foods, fowls, and eggs. Straw used for paper making, hides for leather, wool for cloth, and some other items not eaten may be regarded as incidental by-products.

Corn.—The first European settlers found the American Indians raising, by hoe culture, a single cereal, and called it Indian *corn*, which was the English name for any kind of grain. It is known in many languages as *maize*. Corn is a large species

of grass, growing sometimes to a height of fifteen feet. Each stalk may bear one, two, or more ears, containing the grains in rows upon a woody stem or cob, covered with tough leaves or husks. The skin of the whole plant is tough enough to protect it from insect enemies and it is subject to few diseases. It is well adapted to new and uncleared countries; when planted among stumps or dead trees it will produce edible food in shorter time and in larger quantity than any other grain. It requires frequent rain in the spring, a hot midsummer with bright sunshine and warm nights, and a cool, dry autumn to ripen. It is not profitable where the growing season is less than four months. All these conditions prevail in the highest degree in the American corn belt, which extends from Ohio to Kansas and from Kentucky to Wisconsin (Fig. 40).



FIG. 40. — Distribution of corn. Each dot represents 100,000 bushels.

Cultivation and Harvest. — Between April first and June first, according to locality and season, corn is planted in rows three or four feet apart. As soon as the blades appear above the ground, it is plowed to kill weeds and conserve moisture. This is done by a two-horse cultivator, ridden by the driver, and is repeated until the stalks are half grown. One man and team

can plant and tend forty or more acres of corn. By July the corn is too large to cultivate longer and in September the leaves begin to die and the kernels to harden. The ears are so well protected by husks that the grain can be left in the field for months without injury.

Harvesting is still largely done by hand. The ears are picked from the standing stalks and drawn in wagons to bins having a tight roof but sides with many openings to the air. Hand picking is wasteful of fodder and is being superseded by machines which cut and bind the stalks into bundles



FIG. 41.—Cutting corn in Illinois.

(Fig. 41). Often the stalks are cut by hand and set up in shocks to dry (Frontispiece). The ears were formerly husked or "shucked" entirely by hand, the work being continued into the winter. "Husking bees," attended by all the people of the neighborhood, were held in the barns, and made the occasion of feasting, dancing, and social festivity. Many farmers now use machines, driven by gasoline engines, which husk the ears, and tear or slice the stalks to pieces. This process saves and makes the most of all the fodder. Unripe stalks and ears are cut and packed into silos so closely that they do not spoil, but resemble canned vegetables. Corn thus treated is called ensilage and is fed to milch cows when other fresh fodder is not procurable. Even in localities where corn does not ripen, it may be profitably grown for ensilage and the green grain canned for the table.

More than half the corn crop is fed on the farm to swine, cattle, poultry, and horses and thus converted into meat and power. Animals fed at home help to maintain the fertility of the land, and thus the corn-swine-cattle farm is one of the most efficient food factories yet devised. The proportion of corn sent directly to market varies with the cost of transportation from none to one half. It is used in the manufacture of starch, sugar, sirup, beer, alcohol, and oil.

Crop. — In any state the corn crop is liable to vary greatly from year to year, but there is never a failure in all the states in

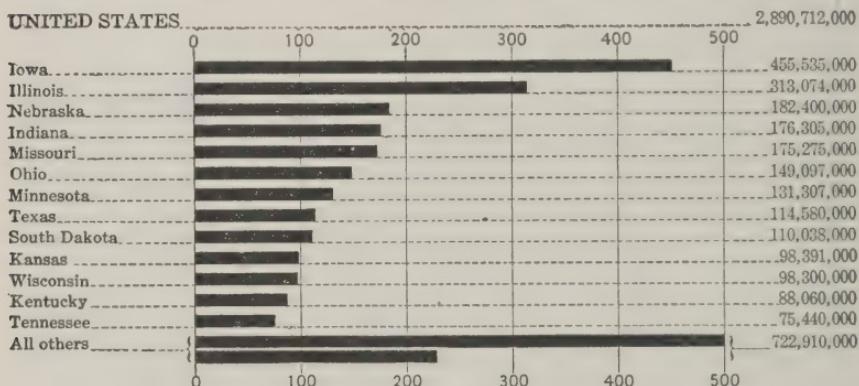


FIG. 42. — Production of corn by states (1922) in millions of bushels. (See Table VI, Appendix.)

the same year. Iowa and Illinois usually lead in corn production (Fig. 42). Corn can be grown throughout the Atlantic division of the United States and its cultivation is increasing in the Southern States, but of the total corn crop of about 3000 million bushels, worth 1500 million dollars, the Middle West produces 71 per cent (Fig. 54). It is the most valuable crop of America and it is practically all consumed at home. The grain itself plays a relatively small part in domestic or foreign commerce, but corn-fed animals and other products are widely distributed at home and abroad.

Influence of Corn Culture. — Corn culture has probably done more to increase the grade of intelligence among farmers than any other branch of agriculture. Through the agency of the agricultural colleges, "corn

schools" and "corn trains" travel over the railroads, giving instruction to all who will assemble at the stopping places. In rural schools prizes are offered to the pupil who raises the best crop of corn. The farmer has learned that it pays to give careful attention to the selection of seed (Fig. 43), to fertilizers, cultivation, and stock feeding. Corn growing has changed from the haphazard methods of the squaw to a highly scientific business.

World Crop. — Corn has come to be an important crop in nearly all parts of the temperate and warm temperate zones, and is the main food grown even on the savannas of central and southern Africa. Argentina, and the countries of southern Europe, especially Hungary, Roumania, and Italy produce the largest crops, outside the United States, amounting in some years to 600 million bushels. The total world production approaches 4000 million bushels, which, possibly excepting rice, is the largest single crop. Corn is a rich, starchy food, differing from other grains in containing an oil which makes it less palatable and more difficult of digestion. Corn flour does not contain enough gluten to make a sticky dough and to be "raised" by yeast, but it is often mixed with wheat flour and made into bread. The peasants of southern Italy live largely upon coarse, corn-meal mush. In Mexico the only indispensable household utensil is the stone upon which the women grind the daily supply of meal for "tortillas," or flat cakes baked upon the hearth.

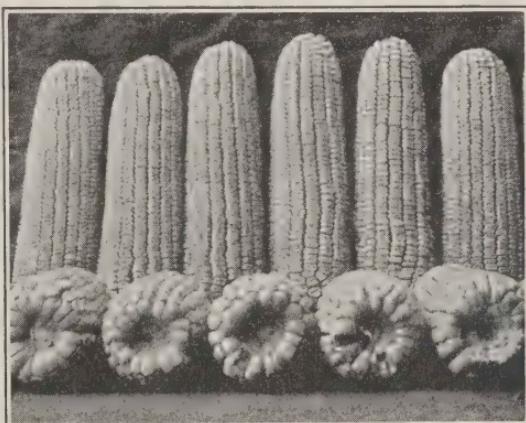


FIG. 43. — Perfect ears of corn.

Wheat. — The plant of greatest value to the human race is the species of grass called wheat. It has been domesticated since prehistoric times, is now grown in all parts of the world where the climate permits, and is the staple foodstuff of advanced peoples. It is easily raised, handled, and stored. Flour is nutritious and palatable, and can be made into a variety of breads, biscuits, and

pastes. Bread is called the "staff of life," and the word is often used as a symbol for food in general, as in the expression, "the struggle for bread." Wheat is a more delicate plant than corn and is liable to injury from insects and rusts.

Wheat is grown throughout the Middle West (Figs. 35, 44), but in the corn belt it is a secondary crop. The wheat belt overlaps the corn belt but extends farther north. It is the leading crop of

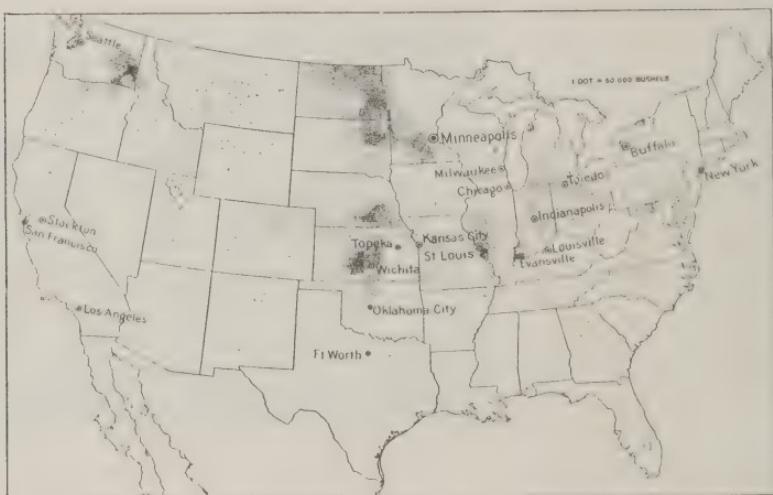


FIG. 44. — Distribution of wheat and flour-milling centers.

the northwest, where the growing season is too short and dry for corn. A good yield requires cool, moist weather during which the plants may "stool out" or form many seed-bearing stalks. Warm, dry weather for ripening and harvesting is essential. A clean seed bed, rather clayey than sandy, compact below and well pulverized on the surface is required. In the corn belt wheat is sown in the autumn, makes a good growth of leaves before winter, stools out in the spring, and is harvested in early summer. Winter wheat needs a permanent covering of snow to prevent repeated thawing and freezing, which heaves the roots out of the ground and "winter kills" the plants. In the northwest wheat is

sown as early in the spring as the ground thaws and harvested in late summer (Fig. 35).

Cultivation and Harvest. — Wheat is sown with horse drills having hollow teeth through which the grain is deposited in shallow furrows about nine inches apart. It requires no cultivation or attention until mature. When ripe, machines cut and bind it into sheaves which are set up in shocks or put into stacks to cure. A thrasher, driven by a steam or gasoline



FIG. 45. — The end of harvest in Illinois. The wheat has been threshed, the grain sacked and the straw piled in a stack.

engine, separates and cleans the grain and piles the straw by itself. One machine may thresh 1000 bushels a day and move in the night to the next field or farm. The grain is drawn to a railroad and stored in elevators (Fig. 144) built for the purpose, whence it is shipped to mills and markets. A crop of wheat requires little hand labor, and one man, with help at harvest time, can raise and market 1000 bushels.

Wheat a New Land Crop. — In a newly settled country where land is cheap, if a market is accessible, wheat is one of the best money-making crops. There was never a better instance of this than in the Red River valley of Minnesota, North Dakota, and Manitoba. There the bed of a glacial lake, long since drained, treeless and as flat as a floor, with a rich, loose soil free from stones, made tillage easy and a crop sure. It was covered with wheat fields for thirty years, until the soil was exhausted by one-crop farming. Now, to maintain fertility, other crops are grown in rotation and cattle are kept. The new lands of the Canadian northwest are being exploited by

the same one-crop system, and will maintain the world's wheat supply for another century.

The wheat crop of the United States varies from 700 to 1000 million bushels (Fig. 46; Table III, Appendix), of which about 70 per cent is grown in the Middle West.

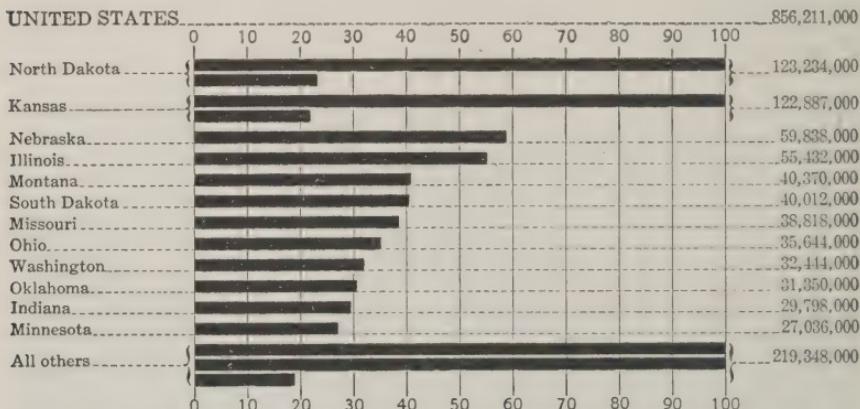


FIG. 46.—Production of wheat by states (1922) in millions of bushels. (See Table VI, Appendix.)

World Crop.—Wheat is above all others the staple product and commodity of the world. Large quantities can be raised, but there is always a demand for more. People go without it only because they cannot get it. The equatorial zone is impossible for wheat except in India, where it is grown in the cool, dry winter and harvested in early spring. The Mediterranean climate of dry summers is ideal. The world's wheat belts lie along the poleward or windward margins of the great arid regions in all continents. Southern Europe, Siberia, India, Argentina, Australia, the United States, and Canada furnish examples. The world's wheat crop is nearly 3000 million bushels, of which Europe produces one third, the United States one fourth, and Asia one eighth. The leading countries, United States, Russia, India, Canada, and France produce about 75 per cent of the whole. The United States is the only country in the world in which the struggle for bread has been wholly successful. Bread is on the table at every meal, and hotels and restaurants usually furnish it with other food without charge.

Distribution.—The distribution of such a commodity as wheat is of especial importance. Old and densely populated countries, like France and Italy, may raise much wheat and buy more.

Young and sparsely populated countries, like Argentina and Canada, may raise much to sell. Crops and surplus vary from year to year, but usually Russia, Argentina, the United States, and Canada have most wheat to sell, while Great Britain, Germany, Belgium, and Italy buy most. The crops, exports, and imports of wheat are given in Table VIII, Appendix. Manufacturing countries like Great Britain and Belgium are dependent on foreign countries for bread, and if their imports were cut off they would suffer from hunger. The Black Sea countries can ship wheat very cheaply by water to the great markets of western Europe. American wheat has to be transported about 1000 miles by lake boat or by rail to reach the coast. To transport a bushel of wheat from Duluth to New York costs, by rail, 12 cents, and from New York to Liverpool 10 cents.

Future Supply. — The law that population tends to increase faster than food supply applies especially to wheat. Since all the new lands of the United States have now been brought under cultivation, there cannot be much enlargement of the wheat belt. The discovery of new varieties makes it possible to extend wheat fields into the steppe and even into the desert, but such expansion is quite limited. The wheat crop may be greatly increased by better farming. The present average yield per acre in the United States of 15 bushels could be raised to the Belgian average of 40 bushels, and will be as soon as the demand and increased price make it profitable. That will not take place until the new wheatlands are occupied and have proved insufficient to meet the increasing demand. For the immediate future the world may look to Canada, Argentina, and Siberia to furnish bread to its rapidly growing population.

Oats. — Oats are adapted to a cooler and moister climate than wheat, and are an invaluable grain in regions where neither corn nor wheat flourishes. The yield per acre is much larger in bulk than that of wheat, but the weight per bushel is about half as great. In the corn belt oats are the third crop in acreage and second in total yield. They are sown early in the spring before corn planting, require no attention until ripe, and are harvested after the period of corn cultivation and usually after wheat

harvest. The same machinery and methods are used as in the case of wheat (Fig. 47). Oat straw is softer and more valuable for fodder than wheat straw. Most of the grain is fed to stock,



FIG. 47. — Harvesting oats in Iowa.

especially horses, but the use of oatmeal for human food has, in the last half century, become quite general. In food value it ranks high, but is more difficult to mill, cook, and digest than wheat flour. The average crop of the United States is about 1290 million bushels, of which 80 per cent is grown in the Middle West. Iowa and Minnesota are the leading states (Fig. 48).

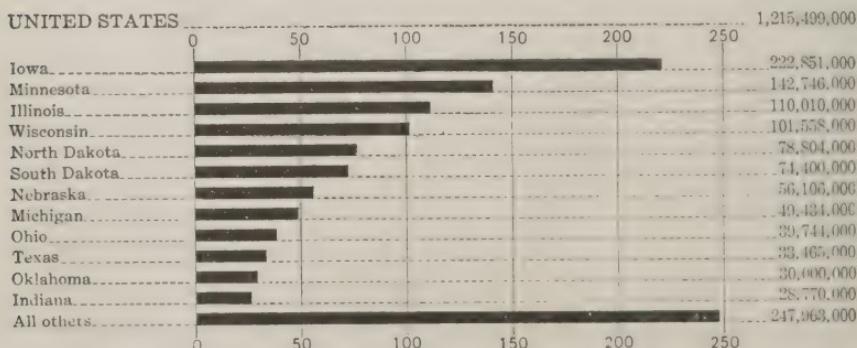


FIG. 48. — Production of oats, by states (1922), in millions of bushels. (See Table VI, Appendix. See also Table III, Appendix.)

World Crop. — The world's crop of oats is about 4000 million bushels, of which the combined crop of Russia and Germany is a little greater than that of the United States. Oats are of great importance in Ireland, Scotland, Sweden, Norway, Canada, and the European rye belt. The Scotch peasantry, noted for their physical and mental vigor, have been until recently nourished largely on oatmeal.

Rye. — Rye is closely allied to wheat, but will mature on poorer soil, in a colder climate, and with less careful preparation of the ground. In the United States it is not now an important crop, because wheat is generally more profitable. The rye crop of 95 million bushels is about 12 per cent of the world's crop; 87 per cent of the United States crop is grown in the Middle West (Table III, Appendix). Rye is often used as a source of the starch from which whisky is manufactured.

The rye belt of the world extends across Europe from the North Sea to the Ural Mountains, where the soil, as in the wheat belt of the United States, is of glacial origin. While the soils of the glacial drift of the United States are of extraordinary fertility, those of Europe are sandy and poor. Thus glaciation in the one case determined the location of a wheat belt and in the other that of a rye belt. The masses of the people in the rye belt eat black rye bread, which is nutritious and much cheaper than wheat bread. The world's crop of rye is about 1800 million bushels, of which Russia and Germany produce two thirds.

Barley. — The hardest of the cereals and the one adapted to the widest range of conditions is barley. It endures cold, heat, and drought, and in the old world is raised from the Arctic shores to the Sahara. Around the Mediterranean it was the chief grain food of ancient times. Its yield is much greater than that of wheat, which it might displace as a breadstuff, except for the fact that it lacks gluten and cannot be made into light bread. In dry regions it is a good substitute for corn as a stock food, and is often cut while green and made into hay. In the United States it has been used in making malt for beer. The barley crop of the United States is about 200 million bushels, of which the Middle West produces about 68 per cent (Table III, Appendix). Minnesota, the Dakotas, Kansas, and Wisconsin raise more apiece than any other state except California. The world's crop is about 1200 million bushels, of which Europe produces one half.

Potatoes. — Next to grain, potatoes are the largest food crop throughout cool temperate regions. They contain little nourishment besides starch, and their food value is low. They may supplement but cannot take the place of breadstuffs. The plant originated on the high plateaus of the Andes and does not maintain itself in a warm climate, yet its range extends from the arctic circle to the tropic. It will grow in all soils except heavy clay. It is raised in the corn and wheat belts for local supply, but is more important in regions too cool for corn and too sandy for wheat.

The edible potato is a tuber, or enlarged underground stem (not root), of which there are many varieties differing in size, color, and quality. The tubers (not seed) are planted in early spring and cultivated like corn, the earth being finally heaped up around the plant to form "a hill." When the stalks are dead the tubers are dug with a fork or hook by hand, or are plowed out with horses. Under favorable conditions the yield is 200 bushels or more from an acre, and the gathering and handling of the crop involve much heavy labor.

Crop. — The total crop varies widely from year to year, a surplus cannot be kept over, and the bulk and weight make transportation expensive. Consequently the price of potatoes and the grower's profits are very variable. They are generally cheap food and the poor man's reliance. The crop of the United States averages about 400 million bushels, half of which

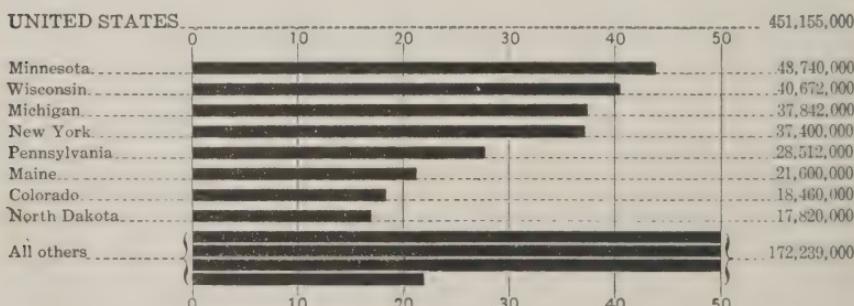


FIG. 49.—Production of potatoes by states (1922) in millions of bushels. (See Table VI, Appendix.)

is produced in the Middle West (Table III, Appendix). Potatoes acquire and maintain their best qualities in certain localities where, in consequence, their culture has become a special industry. Western New York, southern Michigan, Wisconsin, and Minnesota, Maine, Pennsylvania, and eastern Canada are famous (Fig. 49), and supply seed to more southern states. New varieties are produced by sowing the true seed from the seed pods borne on the stalks.

The greatest potato-growing region of the world covers the European rye belt from Ireland to Russia, where the crop approximates 5000 million bushels. In Germany 60 million bushels of potatoes a year are used as a source of alcohol for fuel. This is an ingenious and thrifty method of utilizing the sun's rays for power in latitude 54°.

Hay. — The poetic, scriptural expression of the brevity of animal life, "all flesh is as grass," may be matched by the scientific statement, "all flesh is grass." In the history of the earth, no animals superior to reptiles existed until the period of abundant grasses arrived. As soon as grass became plentiful, the ancestors of our cattle, horses, swine, sheep, deer, and camels appeared and multiplied. Natural or artificial grasslands are now the homes of all the world's most advanced peoples. To what extent men are dependent upon the cereal grasses has already been indicated. Grass is as necessary to a supply of meat as of bread. The corn and wheat belts of the United States are also a hay belt, which produces about one half the crop (Table III, Appendix).

In mixed farming about one half the land is devoted to grass each year. A part of it is pasture for summer feed, and the rest is meadow where hay is made for winter use. Natural pasture or meadow is made up of many species of grass and other herbs, among which the clovers are important. In Indiana and Kentucky blue-grass pastures are famous for horses. In the usual rotation of crops, seeds of timothy grass and red clover are sown on the wheat fields in the spring. The young plants are protected by the wheat until it is cut, and the fields thus "seeded down" are kept in grass for two or three years before they are again plowed. Millet, Hungarian grass, barley, alfalfa, and other species are sometimes sown to cut for hay. The

straw and cornstalks, which are also grasses, added to the hay, make the bulk of fodder produced on a corn belt farm very large, and render live animals and meat the principal output.

Hay is cut in early summer, both before and after grain harvest. Improved machinery enables the farmer to cut, cure, and stack or house hay rapidly and with little or no hard labor. On account of its bulk hay is seldom shipped far, but a certain portion, loose or baled, is sent to the towns and cities to feed horses.

Summary. — The staple food crops of the United States are corn, wheat, oats, barley, rye, potatoes, and hay. Of the cereal grains, except rice, grown in the United States, the Middle West produces 70 per cent and of potatoes and hay about one half.

QUESTIONS

1. Why is the region discussed in Chapter X called the Middle West?
2. Of what special importance is the rainfall line of 20 inches? (See Fig. 29.)
3. What peculiarities of surface and soil in the Middle West make large crops possible?
4. What factors of climate in the Middle West are favorable for food crops? unfavorable?
5. How do the winter storms, bringing rain and snow, affect the crops of the Middle West?
6. If the Gulf of Mexico were dry land, what difference would it make to the Middle West?
7. How can the natural superiority of the Middle West as an agricultural region be accounted for?
8. A good crop of corn has been raised in Kansas with a rainfall of only 8 inches in one year. Explain.
9. Why does corn-growing to-day show a higher stage of civilization than when it was done by the squaws?
10. Why do most people prefer white bread if they can get it?
11. Why are potatoes sometimes called Irish potatoes?
12. How does burning alcohol made from potatoes utilize the sun's rays for power?

CHAPTER XI

THE MIDDLE WEST: STOCK RAISING

THE high efficiency of agriculture in the Middle West is due to the combination of stock raising with crop growing. The grain and bulky forage are converted into power to run the farm machinery for tillage, harvesting, and transportation, and are concentrated into meat of much higher value per pound than the fodder. At the same time a large part of the plant food consumed by the crops is returned to the land in the form of stable manure.

Horses.—Among animals the horse has been most highly prized. On account of his speed, strength, and docility he is equally useful as a pack, draft, or riding animal. Horse riders and drivers have as much advantage over footmen as railroads and automobiles give over horse-drawn vehicles. The horse acquires his best qualities in the steppe (p. 33), but can live in almost any climate where grass grows. He is sensitive to the attacks of insects and is excluded by them from some parts of Africa. When the first Europeans landed in America there was not a horse on either continent. Horses brought by the Spaniards to Mexico escaped from the settlements and ran wild for 300 years. The 21 million horses now in the United States are descended from the best stock imported from western Europe. No other country except Russia has so many. More than half of them are kept in the Middle West (Table III, Appendix) where horse and mule breeding is the special industry of many localities.

Kentucky is famous for fine horses and Missouri for mules. Although displaced to some extent by gasoline and electric motor cars, the horse will

probably never be dispensed with. He may be excluded from cities for sanitary reasons. For general working purposes the mule is a better animal, but the beauty, intelligence, and spirit of the horse make him an aristocrat admired and loved by men.

Cattle. — The most generally useful of domestic animals are the various species of cattle. For flesh, milk, and hides they are superior to all others, and as beasts of burden and draft fill places that no others can.

The carabao, or water buffalo, is as nicely adapted to tropical jungles and marshes as the camel to the desert. The yak is the animal depended upon for milk and transportation on the high plateaus and mountains of Central Asia. The zebus, or humped cattle of India, are more numerous than any other species, and because they furnish the principal means of subsistence are regarded as sacred. The native American species of the family is the bison or buffalo, which once wandered over the prairie and steppe in immense herds, but is now nearly extinct.

Cattle raising is the special and almost exclusive industry of the steppe, but a productive farm can support ten times as many



FIG. 50.—Distribution of neat cattle, and meat packing centers.

animals to the acre as a ranch. Consequently 45 per cent of the 56 million cattle of the United States are found in the Middle West. The farmers buy many young cattle from the ranchmen, fatten them through a winter, and sell them at a handsome profit. This is especially the case in Texas, Iowa, Missouri, Kansas, Nebraska, and Oklahoma (Fig. 50).

Dairying. — The characteristic cattle industry of the region is dairying. While the Middle Western states have eastern rivals

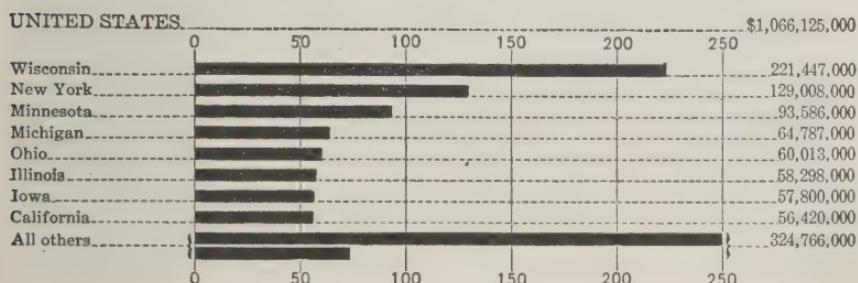


FIG. 51. — Value of butter, cheese, and condensed milk, manufactured by states (1919).

in the dairy industry none quite equals Wisconsin (Fig. 51). This is largely due to the efforts of the School of Agriculture at the State University, which has educated the farmers to a high degree of scientific intelligence and practice. The state has a million and a half of cows and about 3000 creameries and cheese factories for handling their product.

Milk is a perfect food but difficult to preserve from contamination and spoiling. It must be used fresh within about thirty-six hours, or converted into some other form. In regions far from great cities nearly all of it is made into butter and cheese. These processes, once carried on in every rural household, are now more efficiently performed in creameries and factories, where the farmer delivers his milk every day. A high-grade cow, fed upon hay, grain, and ensilage, will yield her own weight of butter, or twenty times her own weight of milk in a year. Butter making has become a highly scientific process. An instrument for testing the amount of butter fat in milk determines its value when sold, and the cream is separated by a machine in a few minutes. A great deal of milk is evaporated, condensed,

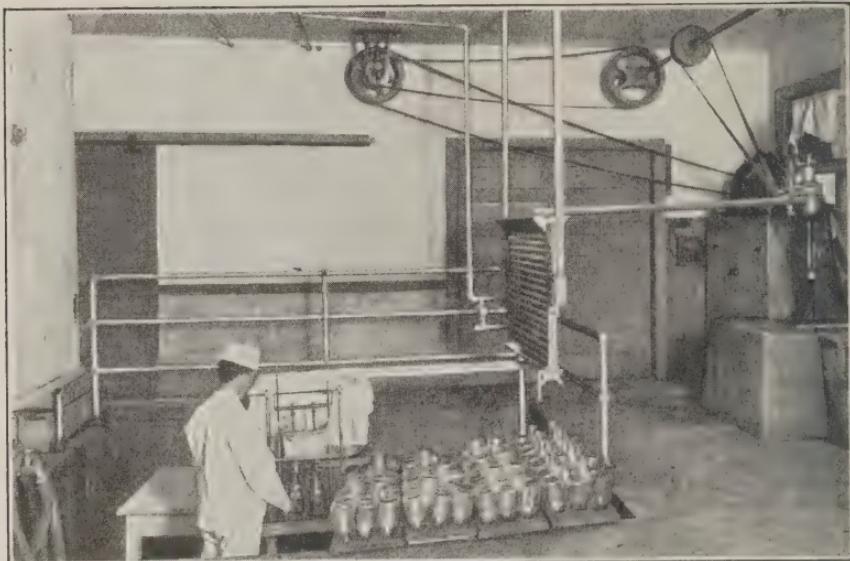


FIG. 52. — Bottling milk in an Illinois dairy.

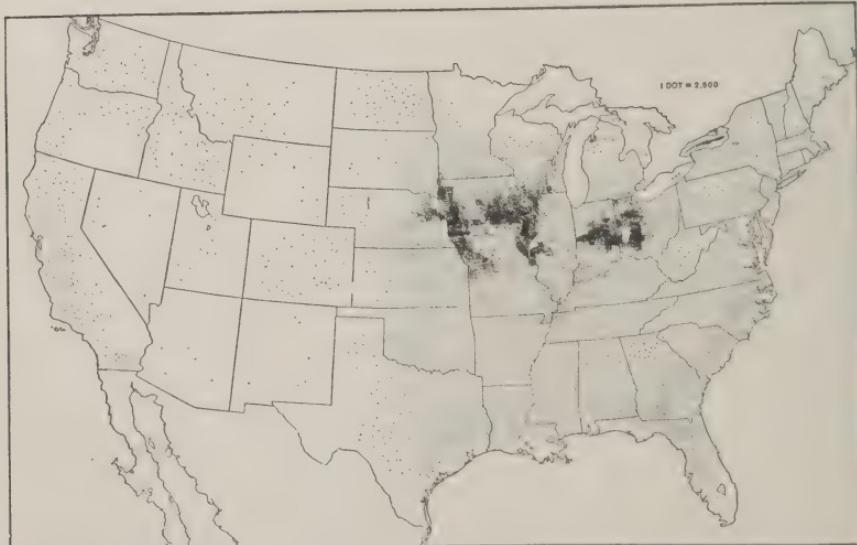


FIG. 53. — Distribution of swine.

and canned to be sent to the uttermost parts of the earth. Dairying (Figs. 52, 55) is a branch of intensive, scientific farming, which yields a good profit on small farms by increase of labor expended.

Holland, northern France, Germany, Denmark, Sweden, and Switzerland are famous dairy countries of Europe.

Swine. — The wild hog is a forest animal (p. 38) living upon nuts, roots, grubs, snakes, and other concentrated food. He will eat almost anything; hence when domesticated he is the poor man's animal, producing from garbage and forage toothsome and nutritious meat. When fed on grain he will grow and multiply faster than any other domestic animal. The corn belt of the Middle West (Figs. 40, 53) raises twice as many hogs as any country in the world outside the United States except Germany. Iowa alone contains nearly 9 millions and the whole region 40 millions (Table VI, Appendix.)

On a farm of moderate size ten litters of a dozen pigs each, born in the spring, are able by midsummer to live on the scattered grain of the wheat and oat fields. Fed through the autumn on the new corn, at the end of the year, after the happiest life possible for pigs, they will aggregate ten tons of pork. There is no more efficient organism for converting vegetable into animal food. Pigs are sometimes fed on clover or alfalfa; these produce less fat and more lean in the meat than corn. In northern Europe barley and sugar-beet pulp take the place of corn in fattening swine.

Sheep. — Of the 37 million sheep kept in the United States, 26 per cent are in the Middle West. Yet sheep raising in that region is relatively subordinate to other farm economies. Therefore, it will be more fully discussed in connection with the Interior States (p. 314).

Poultry. — Of all domestic animals poultry are the most numerous, profitable, and widely distributed. There is hardly a country in the world outside the polar caps where the common fowl is not known and where eggs are not a common article of diet. Fowls are kept in towns and cities by all sorts of people,

and on farms they are a source of incidental income without much care or cost. Like swine they are omnivorous and in summer find an easy living on garbage, scattered grain, fallen fruit, insects, worms, weeds, and grass.

Beauty is a notable element in their value, and poultry fanciers have bred many varieties, differing in form, color, and ornamentation, as well as in egg-laying ability. Poultry raising as a special industry has been promoted by the use of the incubator, which hatches eggs by artificial heat, and the brooding hen is dispensed with. Chicken is generally the most costly meat in a bill of fare. Provided by nature for the nourishment of the young bird, eggs are, like milk, a complete food, but difficult to transport and to preserve. They may be kept in cold storage for months, and dried eggs are said to be a commercial possibility.

Of the 1600 million dozen eggs and 500 million fowls produced annually in the United States the Middle West is credited with about one half. The corn states, Missouri, Illinois, Ohio, and Iowa are leaders in the poultry business. The crowded and intensive farming of China produces enormous but unknown quantities of poultry and eggs. Great Britain imports 200 million dozen eggs a year. When the value to mankind of this humble bird is considered, the act of the man who, after a trip around the world, came home and took off his hat to the old hen, does not seem foolish.

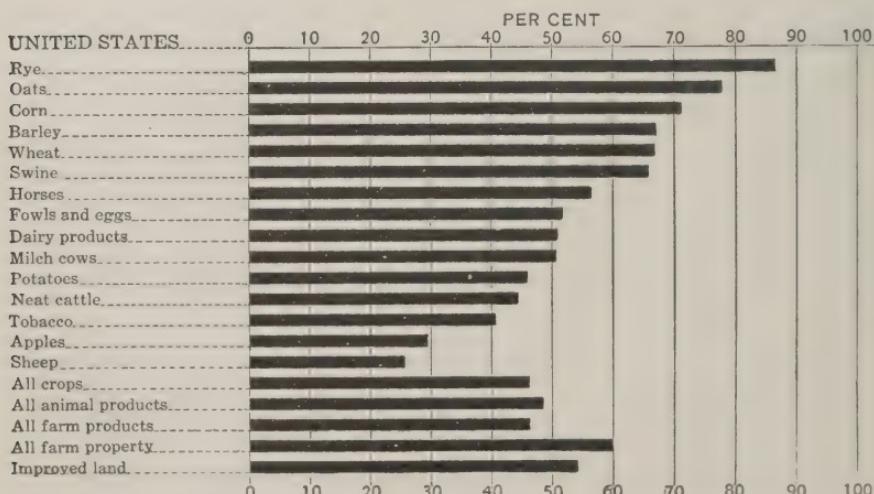


FIG. 54. — Rank of Middle West in agriculture. (See Table III, Appendix.)

Summary. — The most important large domestic animals of the United States are horses, cattle, sheep, and swine. The whole number of these is about 200 millions, of which 45 per cent are found in the Middle West.

The Farm and Farm Life. — Farms in the Middle West vary greatly in size but average about 160 acres. The land is surveyed into sections, each one mile square and containing 640 acres. The sections are divided into quarters so that a square tract of 160 acres is common. The highways usually run along the section lines, and each quarter has a public road on two sides. A few acres near the road are occupied by buildings, stockyards, orchard, and garden. The rest of the farm is divided into fields of 20 to 40 acres, alternately devoted to grass, corn, wheat, and oats, with smaller fields of potatoes or other crops. The old-fashioned rail fences have nearly disappeared, and the fields are inclosed with woven wire supported upon concrete posts. Except on the prairies there is generally a small wood lot, and many trees protect the house from sun and storm.

Log houses (p. 39) are rare and the farmhouse is generally of wood, two stories high, framed, clapboarded, and painted. It looks small as compared with the size of the other buildings. The grain barn may have a floor space of 40 by 80 feet, with wide doorways for driving in with loads of grain and hay. The bays and lofts on either side are filled in midsummer to the roof. The floor is often raised on a stone wall which incloses a basement, opening upon a barnyard with its stack of straw, where stock find a warm shelter in winter. At the side of the barn is a silo (Fig. 55), and not far away are horse stables, sheds for implements, corn cribs, pig pens, and poultry houses. A windmill pumps water from a well, or it may have been displaced by a gasoline engine, which is also used to run a corn shredder, a feed cutter, or a thrashing machine.

The work may be done by the farmer and his son or one hired man with extra help at harvest time. In the growing season the day's work is long, from five o'clock in the morning until six or seven o'clock in the evening; but in the winter the principal



FIG. 55.—Barns, stables, and silo on a dairy farm.

work is the feeding and care of stock, and there is leisure for rest and recreation. The home is comfortably or even luxuriously furnished, and the table is loaded with good food, much of which comes directly from the farm itself.

While life on a farm is laborious, much of its drudgery has been done away with. The work in the open air is healthful, and the standard of living is much above the average of the city. The postman brings mail daily and electric cars may pass the door every hour. There are horses and carriages, and in recent years automobiles have nearly put an end to the isolation and loneliness of farm life. Good schools are accessible, and newspapers and magazines are as plentiful as may be desired. The farmer need not be an ignorant person because he has unusual opportunity and encouragement to be intelligent and thoughtful. In a region of severe winters, good housing and food must be provided for family and herds. Every day calls for foresight, care, and attention, and the shiftless farmer is likely to be a failure.

QUESTIONS

1. Compare the body and legs of a horse with those of an ox and find out why one is a better traveler than the other.
2. What are some of the leading breeds of horses and cattle? What are the good qualities of each?

3. What makes some horses worth from \$1000 to \$20,000 apiece?
4. Why should a perfect farm fence be "horse high, bull strong, and pig tight"?
5. What are some of the leading varieties of the common fowl and for what is each noted?
6. How many eggs do some of the best layers produce in a year? What makes a single fowl sometimes sell for \$100?
7. What are some of the advantages of farm life as compared with city life? some of the disadvantages?
8. How are all the other industries of a region dependent upon farming?
9. How could a country or community with no farmers maintain itself?
10. Which is likely to change more rapidly, a community of farmers or one of city people? Why?

CHAPTER XII

THE MIDDLE WEST : MANUFACTURES

Development of Industry. — Agriculture is a primitive, natural occupation, more congenial to most people than the artificial and unnatural work of manufacturing. The farmer works for himself and has many intervals and periods of idleness. Manufacture requires mostly work for others six or seven days in the week and every week in the year. As long as land is plentiful and cheap, people are drawn to the relatively free, spacious, and bountiful life of the farm. While the Middle West was being settled and brought under the plow, manufactures were small and local, providing breadstuffs, lumber, vehicles, and furniture for the immediate neighborhood. As the population increased and the land became more completely occupied and utilized, it rose in value and could no longer be paid for by the crops of a few years.

The invention of machines made it possible for one man to do the work which once required three or four. Half the rural population was thus left without work. At the same time the quantity of foodstuffs to be prepared for consumption and distribution to distant markets enormously increased. The demand for clothing, furniture, building materials, tools, machinery, vehicles, and luxuries was limited only by the means to pay for them. The resources of power in the coal fields and of constructive materials in the forests and iron mines attracted capital, and the change from an almost purely agricultural community to one of great industrial activity was rapid. The surplus population of the farms went to the towns to work in

stores, shops, factories, and mills, or on the railroads. This supply of labor was not sufficient, but the influx of millions of immigrants from Europe made the city population increase from 23 per cent in 1880 to 50 per cent in 1920,¹ and the total annual value of manufactures nearly four times as great as that of agricultural products (Tables III, V, Appendix).

Manufactures. — The Middle West can supply nearly all the wants of a civilized community except clothing, for which it produces no cotton or linen, and little wool, but many hides. Besides vast quantities of raw material for manufacture there is plenty of coal for metal working and power. The smoothness of the surface makes railroad construction easy and the Laurentian lakes afford a waterway second in value only to the sea. There are few first-class agricultural regions in the world where manufacturing attains such proportions. The quantity of power used is 30 per cent and the value of goods manufactured is 35 per cent of the total for the United States. Among all the states, Illinois and Ohio are second only to New York and Pennsylvania in value of manufactures. Middle Western manufacture is notable for being based almost wholly upon its own raw materials.

Sources of Power. — More than half of the power used in Middle Western manufacture is derived from coal. Most of this is *bituminous*, or soft coal, of which about 220 million tons are mined there annually. Of this coal about 20 per cent comes from the Appalachian field in Ohio (Fig. 96), and 70 per cent from the Eastern Interior field in Illinois, Indiana, and Kentucky (p. 194). The Western Interior and Michigan fields supply the remainder. Besides the coal mined at home, a great deal is brought in from Pennsylvania and West Virginia, including coke and *anthracite*, or hard coal. Illinois and Ohio are second only to those states in amount of coal mined (Fig. 93).

¹ Between 1880 and 1920 the rural population increased less than 25 per cent, the urban population 400 per cent.

Water Power.—The amount of water power used in the Middle West is comparatively trifling but is increasing. Water power depends upon the sea as a reservoir, the heat of the sun to evaporate the water, winds to carry the vapor over the land, and highlands to condense the vapor into rain and to give the water which runs off a rapid fall. The rainfall and run-off of the Middle West are ample, but the absence of highlands makes most of the streams unavailable for power purposes. This is partly compensated by the effects of glaciation, which compelled many streams to take new courses over rapids and cataracts, and left innumerable lakes to act as reservoirs, in which water is stored and from which it is given out during a dry season.

The most important water powers of the Middle West are at Minneapolis and Keokuk. The Falls of St. Anthony in the Mississippi River, originally about 20 feet high, have been used to run flour mills for a century, and the city of Minneapolis has grown up around them. About 1878 the natural fall was improved by a dam, and the 50,000 horse power now available is used to run the largest flouring mills in the world. In the Des Moines rapids the Mississippi, turned into a new channel by the continental ice sheet, falls 23 feet in 12 miles. At the foot of the rapids opposite the city of Keokuk, Iowa, a dam completed in 1914, about a mile long and 35 feet high, gives 300,000 horse power, which will be used to generate electricity, and in that form sent to St. Louis, 137 miles distant, and to other cities.

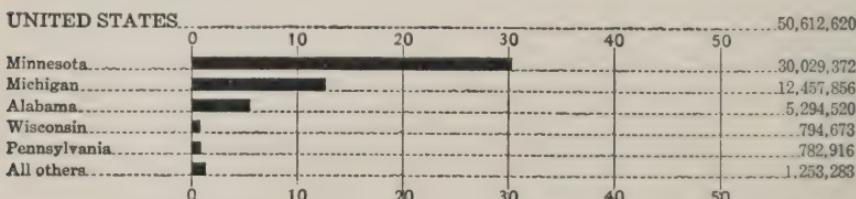


FIG. 57.—Production of iron ore by states (1922) in millions of long tons. (See Table IV, Appendix.)

Iron.—Of equal importance with coal in manufacture is iron for machinery, buildings, railroads, vehicles, and vessels. In this resource the Middle West (Fig. 57) is favored above

all other parts of the country, and has few equals in the world. The old, worn-down highland around Lake Superior, in Michigan, Wisconsin, and Minnesota, contains six "ranges" or belts of iron ore which is rich in metal and free from troublesome impurities (Fig. 50).

In the Mesabi range in Minnesota the ore is excavated in open pits with steam shovels (Fig. 58), which load it upon cars. The cost of mining in this way is small. The Lake Superior mines furnish 85 per cent of all the iron ore mined in the

FIG. 58.—Iron mine, Minnesota.

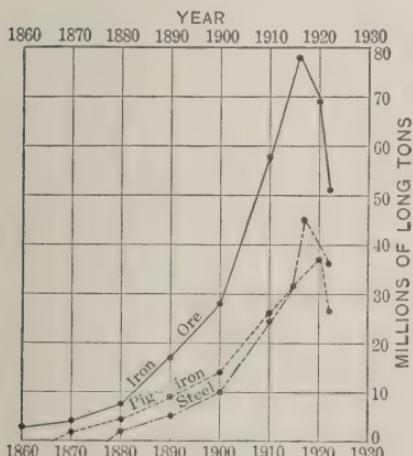


FIG. 59.—Production of iron ore, pig iron, and steel in United States (1860-1922).

United States and have given this country the lead among nations in the production of iron and steel (Fig. 59). The ore is transported to the coal fields in specially built steamers on the Great Lakes, and is discharged at Milwaukee, Chicago, and Gary on Lake Michigan, and at Cleveland and many other lake ports from Toledo to Buffalo. It is distributed by rail throughout eastern Ohio, western Pennsylvania, and northern West Virginia. The ore is handled by machinery with great rapidity and at small cost. Where coal and ore are thus brought together, great iron manufacturing districts have grown up around Pittsburgh,

Cleveland, and Chicago. The greater part of the Pittsburgh district is in Pennsylvania, but 40 per cent of the pig iron and steel made in the United States is produced in the Middle West. Chicago ranks first among cities in blast furnace products and Youngstown, Ohio, second in pig iron and steel.

Other Metals. — Among metals, copper, lead, and zinc rank next to iron in importance, and the Middle West has an ample

store of all three. In the Keweenaw peninsula on the Michigan shore of Lake Superior, deposits of metallic copper in volcanic rock have been worked for more than half a century (Fig. 60). The mines, now nearly one mile deep, yield one eighth of all



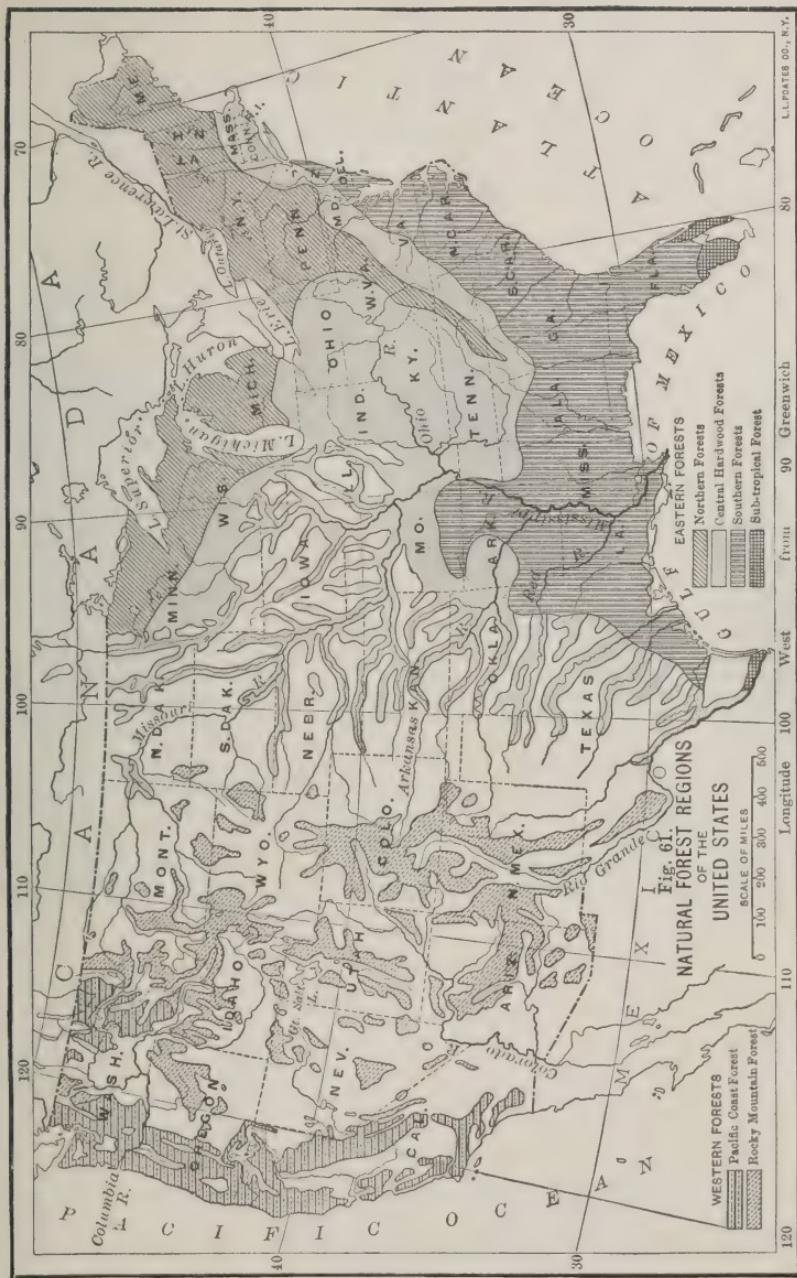
FIG. 60. — Superior iron and copper district.

the copper produced in the United States.

Ores of lead and zinc occur together in two districts, (1) the Galena district, including the adjacent corners of Wisconsin, Illinois, and Iowa, and (2) the Joplin district in the adjacent corners of Missouri, Kansas, and Oklahoma. The two districts produce 18 per cent of the lead and 57 per cent of the zinc mined in the United States.

Timber and Lumber. — Northern Michigan, Wisconsin, and Minnesota were originally covered with a dense coniferous forest, (Fig. 61) which during the last quarter of the nineteenth century was the principal source of pine, spruce, and hemlock lumber for the United States. It was especially valuable on account of its bordering on the prairie and steppe, where building material was very scarce. Probably a majority of the houses and barns now occupied in the Middle West were built out of it. Logs are so large and heavy, and transportation so difficult and costly, that lumbering can seldom be carried on far from waterways.

In the "pineries" trees are usually felled in the winter where the ground is frozen and covered with snow, and drawn on sleds to a stream. Sometimes



engines are used instead of horses for hauling. When the snow melts and the ice breaks up in the spring, a freshet carries the logs downstream to the sawmills, or to a large river like the Mississippi (Fig. 62), where they are fastened together into great rafts and floated to market. The building of railroads has now made all the timberlands accessible.

White pine is the most generally useful wood in the world. It is very light, strong, durable, and easily worked, and while plentiful was used almost



FIG. 62.—A sea of logs in the Mississippi River above Minneapolis.

to the exclusion of other lumber for houses, fences, boxes, and crates. The best quality "clear stuff," free from knots and straight-grained, is familiar in the form of match sticks. The price of white pine has doubled in the last ten years and its place is being taken by hemlock, cypress, and other cheaper woods. It is still generally used for doors and window sashes.

Hardwood Forest. — In Ohio, Indiana, and Kentucky the summer forest attained its greatest density (Fig. 61). The timber was so heavy that in summer little sunlight reached the ground and

undergrowth was small. More than 40 species of trees grew to a height of 100 feet or more and were three to ten feet in diameter. Several species of oak, walnut, and poplar were the most valuable, but ash, hickory, beech, maple, chestnut, cherry, linden, buckeye, elm, and gum were numerous, making up a growth of hardwood timber unequaled elsewhere.

The task of the pioneer was to clear this forest and to make room for corn and wheat. There was little market for the timber and most of it was destroyed by burning the logs. There is now little of the primitive forest left, but a portion of it has supplied materials for great industries in vehicles, tools, and furniture. Oak, ash, maple, chestnut, and poplar find a place in house building; hickory and elm in wagon wheels; and oak, walnut, cherry, and birch in fine furniture. The growing scarcity and cost of lumber has led to the extensive use of *veneer*, or thin sheets of fine and costly wood glued on to the surface of cheaper wood. Veneer is also used for boxes, baskets, and barrels and made into "three-ply" lumber, built up by gluing together three sheets of veneer.

The forests of the Middle West still yield about 10 per cent of the total timber and lumber product of the United States, including the wood ground up to make paper. (See Fig. 63.)

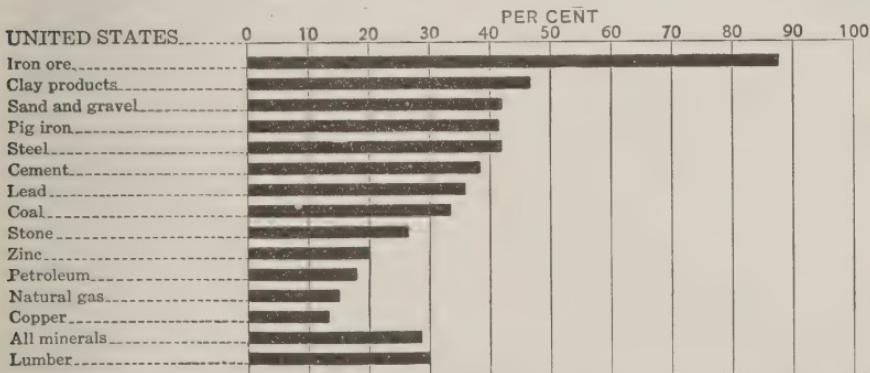


FIG. 63.—Rank of Middle West in mineral and forest products. (See Table IV, Appendix.)

Clay Products.—Among the fundamental industries which sustain civilized communities, the use of clay, stone, and other kinds of rock for building is universal. The pioneer of the Middle

West stopped the cracks in his log cabin with clay. In regions of small rainfall, adobe or clay bricks dried in the sun have been used for ages. Bricks molded from a mixture of clay and sand and burned hard in a kiln are very durable. Brick and stone walls are laid up with mortar made from burned limestone, sand, and water. The need for drainage and good roads has led to the

extensive use of hollow tile and paving brick.

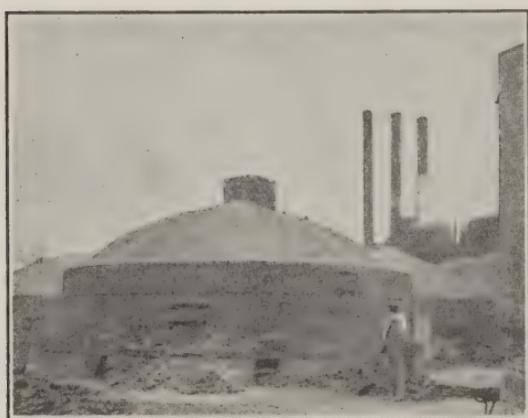


FIG. 64.—A kiln for heating sewer pipe at Brazil, Indiana.

factory. Bricks are now made in a variety of colors and finish which contribute to the beauty of buildings. Tile for underdraining farms and sewer pipe for cities are in great demand (Fig. 64). While these industries are widely diffused throughout the United States, the value of their products in the Middle West is about 44 per cent of that of the whole country.

Cement.—Cement is made by heating a mixture of lime and clay to a high temperature long enough to drive off all the water. It is then ground to a fine powder which, when wet, reabsorbs water and hardens into an artificial stone. Marl, a natural mixture of clay and lime found in marshes and shallow lakes, is often used in the manufacture of cement. The lakes and marshes of the glacial drift plain contain marl in inexhaustible quantities. Among all the states, Indiana is second only to Pennsylvania in the production of cement, and the Middle West makes 40 per cent of the cement used in the United States (Fig. 63).

Brick and Tile.—The glacial clay of the Middle West either in its original beds or in deposits washed out from them, is widely distributed. Shale rock, which is compact and hardened clay, is abundant in many localities, and is ground and used for the same purposes as clay. Nearly every community has its brickyard and tile

Reënforced concrete, recently introduced as a constructive material, consists of a mixture of cement and gravel or broken stone, in which an iron framework is embedded. It is rapidly displacing brick, stone, and wood in the construction of houses, large buildings, bridges, dams, conduits, canals, poles, and posts. The structure is erected by filling wooden molds of any desired shape or size with fresh, soft concrete which solidifies; when the molds are removed, a solid mass is left (Figs. 100, 164).

Pottery and Glass. — The manufacture of pottery is strongly localized either by the presence of some special kind of clay, or by the interests of individual capitalists. The potteries of East Liverpool, Ohio, give that state a rank far above New Jersey, which is second. The Middle West turns out 47 per cent of all the pottery made in the country (Table V, Appendix).

The manufacture of glass requires pure sand, which is abundant in many localities. It must also have cheap, gaseous fuel, which can be blown into a furnace to produce a very high temperature. Natural gas obtained from wells is ideal for this purpose, and the gas fields of Pennsylvania, Ohio, and Indiana have attracted most of the glass works. Since the natural supply has declined, gas is obtained by heating cheap, bituminous coal. Pennsylvania is the leading state, but similar resources in Ohio, Indiana, and Illinois have given the Middle West 35 per cent of all glass production.

Foodstuffs. — Foodstuffs require, to fit them for use, less change from their natural state than other classes of goods. This is evident from the fact that in the rich agricultural region of the Middle West they constitute only about one fifth of the total value of manufactures.

Ice and Cold Storage. — The manufacture and use of ice are characteristic features of present-day economy in the United States. In no other country is ice water a common luxury, or the refrigerator a common household convenience. Artificial ice, first made on a commercial scale in New Orleans about fifty years ago, is now used more than natural ice throughout the states. By artificial refrigeration the preservation and transportation of perishable foodstuffs have been revolutionized. Meats, poultry, eggs, and

fruits are kept in cold storage warehouses without serious loss for months or years. The surplus of one season or year thus becomes available for a time of scarcity. It is no longer necessary to transport beef "on the hoof." Fresh carcasses of cattle, sheep, and swine are shipped from the Middle West to the Eastern and Southern States in refrigerator cars and even to Europe in ocean steamships. By the same means fresh tropical fruits are placed in the summer markets of the north.

Slaughtering and Meat Packing. — This business is carried on in large cities of the corn belt where the cattle and hogs are fattened. Chicago has long held the distinction of being the greatest meat-producing center in the world; Kansas City, Omaha, New York, Indianapolis, and St. Louis are next in rank, but their combined production does not equal that of Chicago. Seventy per cent of the meat of the country comes from the Middle West. (See Figs. 65, 69.)

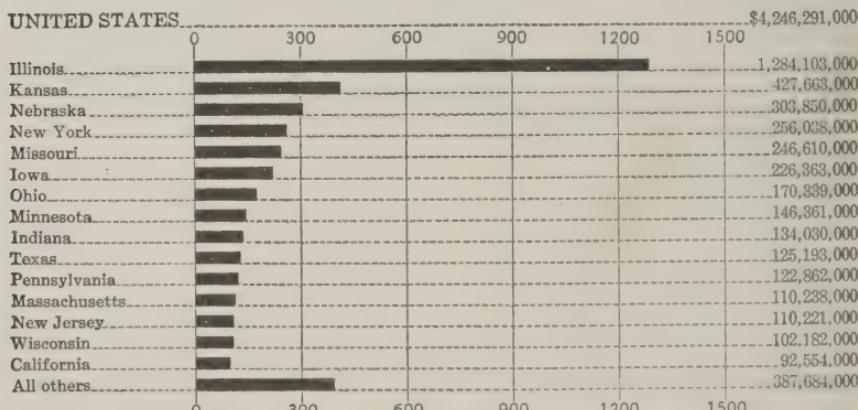


FIG. 65.—Rank of states in slaughtering and meat packing (1919).

At a large slaughtering establishment cattle and hogs enter on their feet, in a continuous line, and traveling almost without pause past a series of workmen, are killed, hung on a trolley, skinned, disemboweled, and cut to pieces, every part going to its proper place, all in a few minutes (Fig. 66). Nothing is wasted, not even the hair and hoofs. Besides meat, materials for soup, glue, mattresses, buttons, and fertilizers are among the by-products. A large part of the fresh meat is distributed without further change in

refrigerator cars. Hams and bacon are smoked, and both beef and pork are salted and canned.



FIG. 66.—Cutting up beef in a packing house.

Milling.—Not many years ago wheat was ground between two cylindrical stones, turned by hand or by a small windmill or water wheel. This process makes excellent flour from the softer varieties of wheat. The hard wheat of the Red River country is crushed between steel rollers, sifted, and reground until 75 per cent of it is converted into a very fine, white flour. The skin or hull of the grain is left as bran and middlings, and fed to stock. Milling is done on an enormous scale at Minneapolis, use being made of the water power of the Falls of St. Anthony. In early times a farmer who raised wheat took it to a near-by gristmill and had it ground, taking home the flour

and feed made from his own grain. Now he sells his wheat at an elevator and buys Minnesota flour. The value of grain ground in the Middle West amounts to 60 per cent of that of

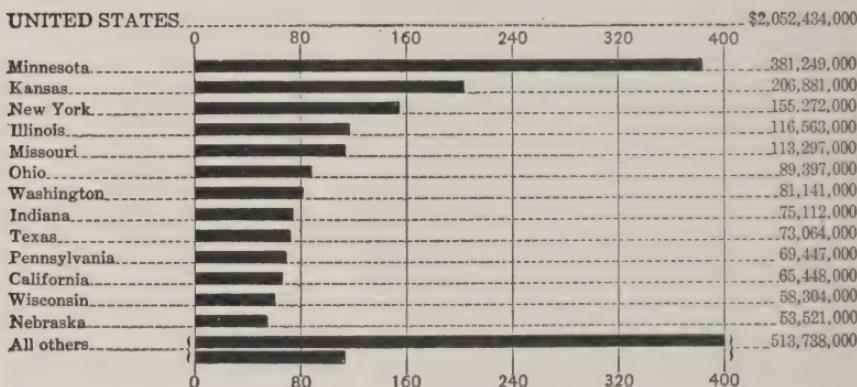


FIG. 67.—Rank of states in flour and gristmill products (1919).

the whole country, and is second only to the value of meat in that section. (See Figs. 67, 69.)

Liquors.—Alcoholic liquors are not food, but are produced from food-stuffs, especially from corn, which is the cheapest form of starch. Consequently the corn belt has supported extensive distilleries and breweries. Since July, 1919, the manufacturing of alcoholic liquor for beverage purposes, in the United States, has been unlawful. Large quantities of alcohol are made for chemical, medical, and industrial purposes.

Implements, Vehicles, and Furniture.—The Middle West enjoys even a larger share in the manufacture of the tools of

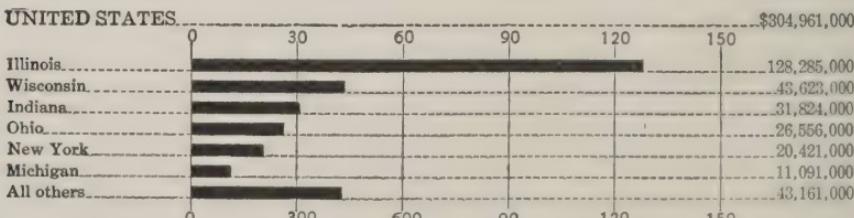


FIG. 68.—Rank of states in manufacture of agricultural implements (1919).

agriculture than in agricultural products. This amounts in the case of implements to 84 per cent, and in the case of wagons

and automobiles to 82 per cent. This is due to the abundance of wood and metal and to the great home demand. The principal centers for machinery are Chicago and Moline, Ill., Racine and Milwaukee, Wis., and Springfield, O.; for wagons and plows South Bend, Ind. (See Fig. 68.)

Furniture is made of hardwood at Grand Rapids, Mich., Sheboygan, Wis., and Chicago, Ill.

The tanning of hides, the canning of vegetables, and the manufacture of electrical machinery are important industries. Printing and publishing stands fourth in value of output, amounting to one third of that in all the states.

Automobiles.—Few industries have ever developed so rapidly as the manufacture of automobiles and autotrucks. Since 1909 the output has multiplied by twelve, and in 1919 amounted to 1,684,000 cars worth \$3,080,073,000. The number and variety of parts and the high quality of material required make it advantageous to build a complete machine by assembling parts obtained from a large number of independent factories, each of which furnishes a special product. This tends to concentrate these related industries at a few favorable points, of which Detroit is far in the lead, with Cleveland a good second. New York, Buffalo, Indianapolis, Chicago, and Flint (Mich.) are also noted centers.

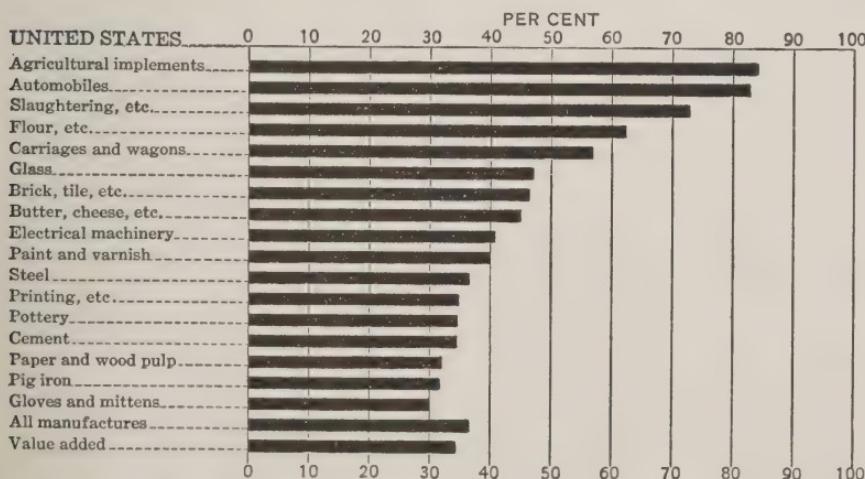


FIG. 69. — Rank of Middle West in value of manufactures. (See Table V, Appendix.)

In 1924 more than 15,000,000 automobiles were in use in the United States. The general use of automobiles has stimulated other industries in iron, steel, rubber, leather, electrical supplies, and above all in the production of gasoline. It has also been the main factor in bringing about an era of good roads.

Summary. — The manufactures of the Middle West amount to more than one third of the total in the United States. The region excels in the production of agricultural implements, vehicles, meats, butter, cheese, flour, and clay products. (See Fig. 69.)

QUESTIONS

1. At a planing mill, get pieces of wood of as many varieties as possible. Try to split, break, and cut them. For what uses is each adapted?
2. What are the advantages of concrete over wood as a building material?
3. What are the advantages of water power as compared with steam for running a factory?
4. In an artificial ice plant, coal is burned in a furnace, and by means of the power produced water is frozen. Explain.
5. Why have nearly all the small water-power sawmills and gristmills, once common in the Middle West, been abandoned?

CHAPTER XIII

THE MIDDLE WEST : COMMERCE AND TRANSPORTATION

Production, Consumption, and Distribution. — In the last three chapters an account has been given of the principal kinds of productive and constructive work done in the Middle West. Nearly every square mile of land furnishes some useful thing, and there is many a square mile upon which *production* is so concentrated that the total product is worth millions of dollars. On nearly every square mile there is at least one household which uses or consumes a variety of products; and where the population is dense, *consumption* amounts to millions of dollars' worth in a square mile. As a rule, very few products are consumed at the place where they are produced or by the people who produce them. There are many producers and a still greater number of consumers, including the producers themselves, each one of whom wants more of the goods produced by others than of his own products. In a general way, everybody has something to do with supporting everybody else. Hence the work of *distribution*, or getting the goods wanted from every producer to every consumer, is as important and almost as great as production itself. Distribution is accomplished through *trade*, or exchange of goods, and by means of *transportation*, or movement of goods.

Commercial Basins, Channels, and Divides. — In the natural drainage of water from the land, every stream has its basin from which water flows into it, and each basin is surrounded by a divide, beyond which water flows into some other stream. In the distribution of goods there are similar basins and divides. Every town has a certain district or basin around it, with which

it habitually does business, from which produce is brought for sale, and to which goods are supplied. Between the commercial basin of one town and the basin of neighboring towns there is a divide or strip of country where the trade of two towns overlaps. The commercial basin tributary to a large town includes the commercial basins tributary to many smaller towns.

In the same way every transportation line, be it country road or trunk railroad, serves and draws business from a certain territory or basin lying on both sides of it. At some distance, great or small, from the line is a divide or boundary beyond which business ordinarily goes to some other line. The movement of goods within a basin, large or small, is known as *local* traffic. The movement of goods across divides from one great basin to another is called *through* traffic. On trunk lines the through traffic is much greater than the local. Commercial distribution resembles the natural drainage of the land in being carried on through main channels, which divide and subdivide into innumerable tributaries ramifying all through the territory. In a drainage channel water runs in only one direction, but in a commercial channel goods move in both directions.

The Circulation of Goods. — People could not live as they do in the Middle West without a very great movement of goods and people. Only a small part of the products of agriculture is used on the farm where they are grown. Probably 75 per cent of all the grain, roots, fruit, meat, milk, and eggs produced by the farmer is hauled to some market town and sold for money. Among the goods bought and taken back to the farm are tools, machinery, vehicles, lumber, brick, wire fencing, coal, flour, sugar, coffee, tea, spices, crockery, silverware, furniture, carpets, clothing, and a hundred small luxuries of comfortable living, all approximately equal in value to the products sold.

In towns the business of manufacture involves a greater movement of goods than the business of agriculture does in the country. The manufacturer must get building materials, tools, and machines from various other manufacturers and raw materials from far and near. Then his manufactured goods must be distributed to the consumers over a wide territory. To this movement and exchange of home products are added the sending abroad, or *exportation*, of goods to foreign countries and the *importation* of

foreign goods from all parts of the world, these also to be distributed to the consumers in every community. The wholesale houses in the large cities obtain goods, domestic and foreign, in large quantities, assort and repack them in smaller lots and distribute them to the retail dealers in every town and crossroads.

In every prosperous community there are going on a collection of goods from every producer and their redistribution to every consumer, thus setting up a vast system of *circulation*, something like the circulation of blood in the human body. It brings to each household the materials needed and carries away the materials not needed. Every household is enabled to sell whatever valuable thing it produces and to buy anything it needs and can pay for, and the wants of every consumer are in a large measure supplied. We seldom go without things we want because they are not in the market, but generally because we cannot afford to buy them.

Local Transportation. — The first movement of goods sold by the producer and the last movement of goods bought by the consumer involve a large amount of teaming, or transportation by horse and wagon. In towns and cities, where this traffic is concentrated and congested, horses are being displaced by motor trucks. While necessity has compelled the paving of city streets, the country roads used by all the rural population have been, until recently, poorer in the United States than in any other commercial country in the world. The farming communities have been generally indifferent and insensible of the cost to themselves of the common dirt road, poorly made and maintained, and during wet seasons almost impassable. Over a large part of the Middle West this condition is relieved in winter, when heavy hauling can be done with sleighs on frozen and snow-covered ground.

The needs of travel for pleasure and business, first by the bicycle and later by the automobile, have aroused the people to the advantages of improved roads. The movement for good roads has now become general, and states, counties, and townships have combined to make and maintain highways that traverse

the country in every direction (Fig. 70). In many cases the construction of a good road past a farm adds to its value twice



FIG. 70.—A good road across the prairie.

the amount of the cost for road improvement taxed upon the farm.

Electric Interurban Railways.—The generally level surface of the Middle West makes that part of the United States especially favorable for the extension of “trolley lines,” or railways which often follow the highways and carry light cars driven by electricity from a central power house. The cars running singly at frequent intervals and stopping almost anywhere, carry people, mail, milk, and small articles of freight. Thus communication and trade between the rural and the urban population, and between the smaller and the larger towns are greatly increased and facilitated. Men working or doing business in the city can have homes in the country, farmers are no longer isolated, and the advantages of town and country are brought within the reach of all. Ohio, Indiana, Michigan, and Illinois have more extensive “traction systems” of interurban railways than the other states

(Fig. 71). In the territory covered they carry more passengers on trips of 100 miles or less than do the steam railroads.

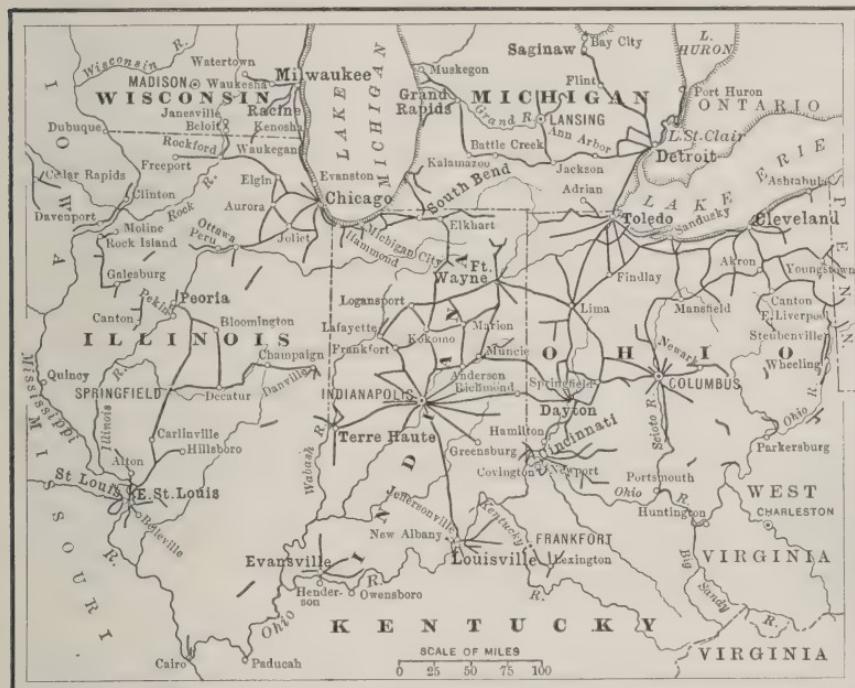


FIG. 71.—Traction system of some Middle Western states.

Railroads.—The most extensive and efficient means of transportation in the United States is the steam railroad. The Middle West is especially favorable for railroad construction and operation. The level surface makes grading easy and inexpensive. The line may be run in any direction and in a nearly straight course. Sharp curves, deep cuts, high fills, tunnels, and long bridges are seldom required. The track is laid upon a bed of dirt and gravel, and steel rails resting on wooden crossties make a road so smooth, hard, and durable as to permit heavy loads and high speeds. The main trunk lines are equipped with double or even quadruple tracks. Freight trains of 70 or more cars, having a total length of half a mile and carrying a

load of 3500 tons, can be drawn by one engine. Passenger trains of ten coaches are run long distances at an average speed of 50 miles an hour.

Centers and Trunk Lines. — Lake Michigan projects southward to the center of the Middle West, forming a barrier impassable for railroads. This makes its southern end at Chicago the greatest railroad center and terminal in the world. The longest and best equipped trunk lines extend from it to the east, south, west, and northwest, but the movement of goods is greater toward the east than in other directions. This is due to the dense population of the Atlantic states, which consumes great quantities of foodstuffs, and to the situation of Atlantic sea ports, which carry on foreign trade, especially with Europe. Duluth, St. Paul, and St. Louis are also important terminal points. No eastern system extends farther west and no western system extends farther east than a line connecting these cities with Chicago, which thus forms the principal railroad divide of the United States. Thousands of cars, however, are transferred from one system to another and pass through.

Eastern Systems. — There are nine great railroad systems which connect the Middle West with the Atlantic seaboard. With few exceptions they are closely connected with ports and steamship lines on the Great Lakes. (See Fig. 56.)

The *New York Central* system has two trunk lines between Chicago and Buffalo: the *Michigan Central* which runs through Canada, north of Lake Erie, and the *Lake Shore and Michigan Southern* which runs along the south shore of the lake. A line from St. Louis joins the latter at Cleveland, and numerous branches cover the territory between the lakes and the Ohio River. The outlet from Buffalo is through the Mohawk-Hudson gap to New York, the lowest and easiest pass across the Appalachian Highland.

The *Pennsylvania* system also includes two lines from Chicago and one from St. Louis which unite at Pittsburgh. Its branches and connections are even more numerous than those of the New York Central system. The main trunk road crosses the Appalachians from Pittsburgh to Philadelphia and New York by the Susquehanna valley.

The *Baltimore and Ohio* lines extend from Chicago and St. Louis to Cumberland, Md., whence the trunk road follows the Potomac valley to Baltimore. Still farther south the *Chesapeake and Ohio* and the *Norfolk and Western* connect Chicago, Louisville, and Cincinnati with the mouth of Chesapeake Bay.

The *Nickel Plate*, a single unbranched line from Chicago to Buffalo, is shorter than its rivals. The *Erie*, from Chicago to New York, is less direct and the longest of all.

Branches of the *Grand Trunk* and the *Canadian Pacific* connect Chicago, St. Paul, and Duluth with the Canadian systems which reach the sea at Montreal, Halifax, St. John, N. B., and Portland, Me.

Western Systems. — More than a dozen railroad lines run westward from Chicago to the Rocky Mountains, and half as many extend from the Mississippi and Missouri rivers across the continent to the Pacific coast. Some of these systems, like the *Chicago and Northwestern* and the *Chicago, Rock Island, and Pacific*, cover the most productive territory with a close network of branches. Others, like the *Great Northern*, *Northern Pacific*, *Union Pacific*, and *Santa Fe*, have few branches and stretch out to transcontinental lengths.

Among a half dozen north-south lines, the *Illinois Central*, from Chicago to New Orleans, is a successful rival in transportation of the Mississippi River, with which it runs parallel.

The branches of the great systems, together with numerous, shorter, independent lines, cover the Middle West with a network so close that areas more than ten miles from a railroad are few and small. There are 100,000 miles of railway, or over 40 per cent of the total mileage of the United States (Table I, Appendix). Notwithstanding this enormous development, the railroads are at some seasons congested and unable to move all the goods needing distribution.

Waterways. — The easiest and cheapest of all methods of transportation is by water. A waterway has little or no slope and requires no outlay for grading, track laying, or maintenance. A small vessel can carry a larger load than any car and the largest can carry the load of ten freight trains. Less power is required to move a load on water than on the best railroad. If a steamer and a freight train were loaded with the same number of tons

at Toledo, the cost of moving the load to Buffalo would be less on the lake than on the railroad which follows the shore. On the other hand natural waterways generally need to be improved by the removal of obstructions. Shallow places are deepened, canals are dug around rapids and falls, and harbors, docks, and lighthouses are constructed. Many inland waterways are closed a part of the year by ice. Railroads can be built wherever needed and kept in service at all seasons. Artificial waterways or canals are very costly to build and to maintain, and transportation by water is much slower than by rail.

The Middle West enjoys the advantage of the two greatest inland waterways in North America, the Laurentian Great Lakes and the Mississippi River system. (See Fig. 56.)



FIG. 72.—Conneaut Harbor, Ohio. Unloading iron ore from Lake Superior.
(See Fig. 73.)

The Great Lakes.—The four upper lakes, Superior, Michigan, Huron, and Erie, occupy basins in an upland about 600 feet above the sea. The lake surfaces stand higher than the country on

the south, so that a divide from which streams flow away to the Mississippi system occurs within a few miles of the shores. In the past these lakes stood higher than at present and overflowed through several outlets to the Mississippi. At present they form a wide, deep, nearly level waterway equivalent to an inland sea.

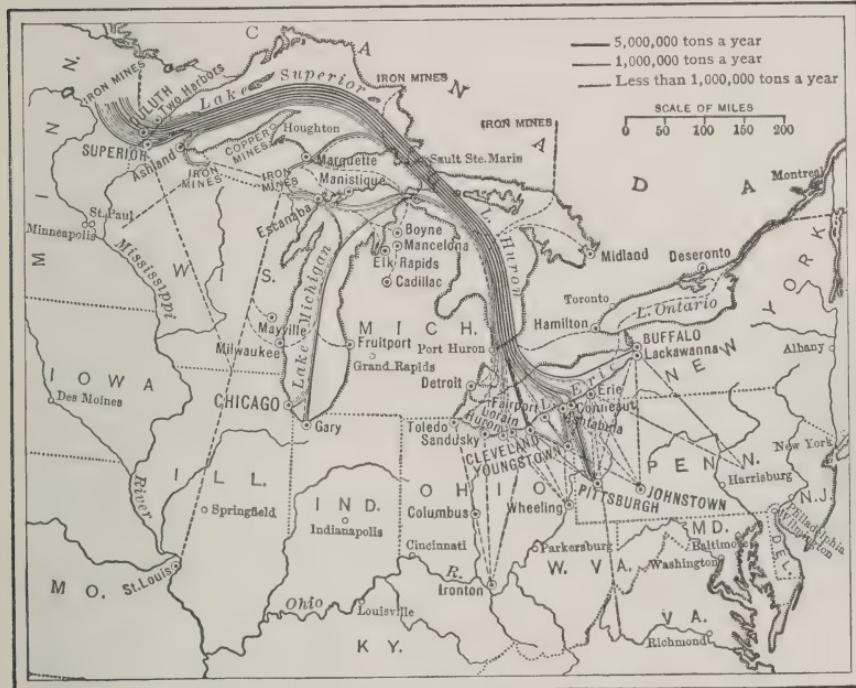


FIG. 73.—Distribution of iron ore from the Lake Superior district.

A vessel can pass from Duluth to Buffalo, a distance of about 1000 miles with a descent through the St. Marys River of 21 feet, and through the St. Clair and Detroit rivers of 8 feet. The descent from Chicago to Buffalo, about 900 miles, is only 8 feet. From Lake Erie to Lake Ontario through the Niagara River there is a fall of 326 feet and vessels can pass only by way of the Welland Canal in Canada. Therefore, so far as the United States is concerned, the lake route practically ends at Buffalo. (See Fig. 73.)

Tonnage and Rates. — The lakes are open for navigation less than eight months in the year, yet the freight carried exceeds in tonnage that of any other inland waterway in the world, equals that of the Mediterranean Sea, and exceeds the combined foreign trade of New York, London, and Liverpool. The size of the vessels used is limited by the depth of water in the "Soo" canals around the rapids of the St. Marys River. The largest, when loaded, draw 20 feet of water and have a capacity of 12,000 tons. The heaviest traffic is in iron ore (Fig. 73), lumber, grain, flour, and copper eastbound and coal westbound. Ore and coal are run into a vessel from a bin on the dock above it and taken out by scoops which grasp and lift many tons at once. A vessel may be loaded in less than an hour and unloaded in one day. Ore is carried from Duluth to Erie ports for about 65 cents a ton, grain from Chicago to Buffalo for 40 cents, and coal in the other direction for 30 cents.

The lakes control in a large degree the location of railroad lines, of which nearly all the great systems to the east, west, and south reach one or more of the lake ports, and some of them run parallel with the lake route. The western and southwestern roads bring goods to Superior and Michigan ports, whence they are shipped by water to Erie ports. There they are again loaded on cars and sent by rail to the Eastern States. The westward movement of goods by the same routes is large, but smaller than the eastward. The railroads not only coöperate with the lake vessels but compete with them in carrying goods which, like fresh meat, require rapid transportation.



FIG. 74.—Ice breaker freight boat used on the Great Lakes in winter.

In the winter the lakes are frozen (Fig. 74) and the railroads must do all the business. The vast system, comprising the lake routes and the rival and connecting railway lines, has been compared to a thick cable of many strands, which at each end are untwisted and spread out (Fig. 73).

The Mississippi System. — The Mississippi, one of the largest rivers in the world, bisects the Middle West along a line nearly midway between the eastern and western borders. Two great

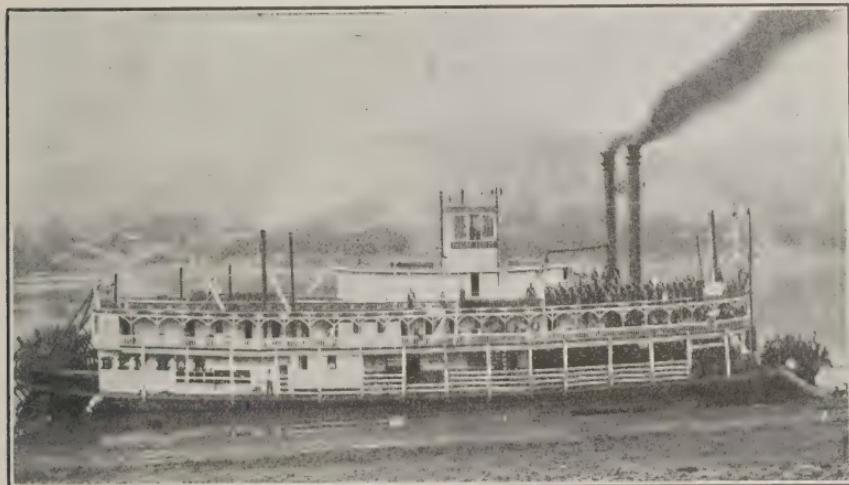


FIG. 75.—A steamer on the Ohio River.

tributaries, the Missouri and the Ohio, with their branches furnish navigable waterways to two thirds of the area (Figs. 33, 56).

These natural arteries of economic circulation were used in the exploration and early settlement of the country. Trade was almost entirely southward, with New Orleans for a seaport, until the opening of the Erie Canal from the Hudson River to Lake Erie in 1825 made an easy outlet to New York, and diverted the main currents of traffic eastward. Population had previously entered and settled along the Ohio and Mississippi, but now it came in by the canal and occupied the lands around the lakes. This movement was favored and extended by the construction of canals from Lake Erie at Toledo to the Wabash River and to the Ohio at Cincinnati, from Cleveland to the Scioto and the Ohio, and from Chicago to the Illinois River. The canals were

soon followed by several east-west lines of railroad, which caused a decline in traffic by water, but a great increase in total movement of goods. The closing of the Mississippi during the Civil War gave commerce on the rivers a blow from which it has never recovered, and the extension of railroads has kept the traffic by water between the Middle West and the Gulf of Mexico down to an insignificant quantity. The chief river business is now the shipment of coal in barges from Pennsylvania to points on the Ohio, Mississippi, and Missouri (Fig. 56).

The Neglect of Waterways. — The United States, including especially the Middle West, stands alone among great commercial countries in the neglect of waterways and the extension of railroads. While in western Europe the natural waterways have been improved and extended by canals until they carry more freight than the railroads, in the United States only the Great Lakes are extensively utilized. Although the railroads are congested and unable to meet the demands made upon them, comparatively little use is made of the rivers, and canals formerly constructed have been in many cases abandoned. Even the old Erie Canal became nearly useless and had to be greatly enlarged (Fig. 124).

The causes of the backward state of water transportation in the Mississippi basin are partly natural and partly artificial :

1. The Missouri River and the lower Mississippi are so loaded with sediment that the channel is shallow and extremely crooked, shifting, and difficult to navigate. The whole system, including the Ohio, is subject to great floods in the spring and to very low water in the autumn. In the present condition of world trade, the rivers lead in the wrong direction, the greatest markets being on the Atlantic coasts of America and Europe.

2. The use of the Great Lakes is easy, unpreventable, and, on the whole, favorable to the railroads by carrying to them an enormous bulk of freight. The use of streams is difficult and their improvement requires the expenditure of large sums of public money. This has been successfully discouraged by the builders and managers of railroads, who see in them formidable rivals.

Present conditions are not likely to continue. The opening of the Panama Canal, the decline in relative importance of European markets, and the future trade with countries around the

Pacific may draw such a movement of goods toward the Gulf as to compel the improvement and use of the waterways. Canals already begun or projected from Chicago to St. Louis and from Cleveland to Pittsburgh may connect the lakes with the Mississippi system. Although the cost would be very great, the rivers may be so improved as to fill the largest place in the commerce of the Middle West which it is possible for them to do.

Summary. — Goods produced on farms and in factories must be distributed to the people who use them. Hence the work of distribution becomes as great as that of production. This is done by vehicles on roads, railroads, and waterways. The Middle West has two great waterways and a close network of railroads. The railroad mileage and traffic are the greatest in the world. River transportation, now neglected, will probably increase in the future.

QUESTIONS

1. In laying out a road is it better to go around a hill or over it? Why?
2. Why are "cuts and fills" made in grading a road? Why is a good wagon road highest along the middle?
3. What materials are used on roads for making a hard, smooth surface?
4. Why is a railroad the best of all artificial roadways?
5. How is a railroad made more straight, level, smooth, hard, and durable than any other roadway?
6. What advantages for passenger traffic have the electric interurban roads over steam railroads?
7. Why does the railroad net shown in Fig. 56 become abruptly less dense at about the 100th meridian? Why is it less dense in northern Minnesota and southern Missouri and Kentucky?
8. Why is a lake route superior to a river route for transportation?
9. Compare waterways and railroads as to the advantages and disadvantages of each.
10. What goods would be carried each way on a waterway 20 feet deep between Chicago and New Orleans?

CHAPTER XIV

THE MIDDLE WEST: CITIES

Growth of Cities. — A city is the product of all the natural conditions and economic forces of a community, and is, therefore, extremely complex. Savages often live together in small villages for the sake of company, for protection from enemies, and for coöperation in hunting, fishing, or herding. In early English history a town was a collection of dwellings inclosed by a hedge, palisade, or wall for protection, but the modern town owes its origin and existence to the demands of trade. When the division of labor has progressed so far that each household or village produces only one or a few kinds of goods, permanent trading centers become necessary. Such places are advantageous for artisans, smiths, carpenters, shoemakers, tailors, and millers, as well as for tradesmen, and the two main characteristics of the modern city, trade and manufacture, are established at the same place. One thing essential for the existence of every commercial center is *accessibility*. It must be located where people and goods can reach it easily. The size and importance of the center depend upon the population and the products of the surrounding territory, and upon the means of communication with other centers and countries the world over.

The Crossroads. — The simplest example of a trade center in the United States is the country crossroads where two or more highways meet. A general store supplies the common wants of the community and a blacksmith carries on primitive industry. A schoolhouse and a church render the place a social as well as an economic center. If a railroad comes to the place, its importance is increased in proportion to the added facilities for transporta-

tion, for the sale and shipment of produce, and for the supply of goods for distribution. The area of the tributary territory, or commercial basin (p. 149), of the town depends upon the facilities for the movement of goods and people to and from it. If these are sufficient, the town grows into a city, where many sorts of trade and industry are carried on and where people throng, not only for work and business, but for pleasure, luxury, education, culture, and other means for fuller and better living. Everything depends upon the advantages of *location*, and the greatest advantage of location is accessibility by waterways and roads.

Large Cities. — The most favorable site for a large city is generally a place where goods must be transferred from one means of transportation to another. This is especially true of seaports, lake ports, and towns at the head of navigation on a river, where goods must be changed from land to water and from water to land. In the United States no town can be very large without a railroad. The rule is, railroads make a city and a city attracts railroads. Thus cities and railroads increase and multiply together indefinitely until a limit determined by other conditions is reached. Some of these limiting conditions are the population and resources of the surrounding country, the presence or absence of coal or water power for manufacture, the growth of rival cities, the presence of capital to carry on business, the supply of human labor, and the degree of safety of life and property secured by city government, sanitation, and general management. Every city wants to grow larger, and does everything it can to attract new business enterprises and to increase its population.

Conditions of City Life. — The conditions of urban life are in most respects very different from those of country life. A city produces practically no raw materials for food, clothing, or construction, but uses enormous quantities, which must be brought in, mostly from long distances. It must be adequately and constantly fed with everything needed, and any interference with the regular supply may be disastrous to the welfare of some or all its citizens. When a storm blockades the railroads and cuts off the supply of milk for a day or two, children suffer or even

die in consequence. To distribute the materials to every store, factory, and household involves as much labor and expense as to maintain the supply.

The business and public buildings on a grand scale and the thousands of residences which are so conspicuous, form perhaps the smaller part of the engineering construction required. A great city may level hills, fill valleys, bridge straits, dam, deepen, or divert waterways, tunnel through ridges and under rivers, and obliterate or overcome all natural obstacles. Miles and miles of streets are graded and paved. They are crowded with coach and car lines for rapid movement of people, and with trucks, drays, and wagons for the delivery of goods. Sewers for the drainage of waste, pipes for the distribution of water and gas, and conduits for electric cables and telegraph and telephone wires form underground systems of circulation comparable in number and complexity with the canals, ducts, blood vessels, and nerves of the human body.

Sanitation. — The crowding of so many people upon a small space renders municipal problems especially difficult. The ground becomes saturated, and the streams and wells polluted with human waste; the air is foul with smoke and the products of decomposition. In such an environment the germs of disease breed and multiply, and are rapidly distributed by the mingling of all sorts of people. The greatest municipal problem is sanitation, and that depends on cleanliness. The life and health of a city can be secured only by adequate sewerage and an abundant supply of pure water. The prompt removal of garbage from every house, and of filth, water, and snow from the streets, the suppression of smoke, and the opening of parks and breathing spaces in every quarter are valuable means to the same end. A large city finds it necessary to expend millions for sewers, water supply, cleaning, and parks.

Business and Residence Districts. — A commercial city may be divided into business and residence districts of various kinds, each occupying more or less distinctly its own quarter. Factories and wholesale houses are usually distributed near the waterways and railways, by which goods are received and sent out, and hence occupy the lowlands. Offices, banks, shops, and stores tend to crowd as closely together as possible, each one wish-

ing to secure the customers which visit the others. Hence the retail business district is the place where land values and rents are highest and where the population is most dense by day, although it is almost deserted at night. The "slum" district, where the poorest people live, may be greatly congested, and here the conditions of life are necessarily at their worst. The good residence districts occupied by people of moderate means are the most extensive of all and cover a half or three fourths of the city site. In the fine residence districts the density of population is least. These districts are usually situated farthest from the business center, gradually thinning out into more or less open suburban tracts. The bicycle, motorcycle, automobile, and electric car have greatly increased the convenient distance between home and business, scattered the citizens out into the suburban districts, and done much to relieve urban congestion. In many cases, on account of the high cost of land in the city, special industries have been located outside and have built up a distinct, suburban, manufacturing town.

Cities of the Middle West. — The most striking change in the Middle West in the last forty years has been the increase of urban population, which has accompanied the growth of manufactures and the development of mineral resources, such as coal and iron (p. 133). While the total population increased 70 per cent in 1880-1920, the urban population increased 216 per cent and amounted (1920) to 51 per cent of the total. Of cities of more than 10,000 population (1920) there are 251 or one third of the whole number in the United States. There are 98 cities of more than 25,000 people, of which Ohio has 21 and Illinois has 17. Of cities of over 200,000, Ohio has five, Minnesota two, Missouri two, and Illinois, Indiana, Kentucky, Michigan, and Wisconsin one each. There are four cities which have within their municipal limits more than 500,000 people, one of which has nearly 3,000,000. In the study of large cities, it is better to disregard political boundaries and to take into account the "metropolitan district," or economic center, including all the organized towns which lie near the principal city and have the same business interests, although they may be in another state. Out of 36 metropolitan districts of high rank (value of manu-

factories) in the United States, 15 are in the Middle West (Table VII, Appendix). The principal cities may be geographically grouped as (a) lake ports, (b) river ports, and (c) inland cities.

Chicago. — There is no city in the world 1000 miles from the sea so favorably situated for commerce as Chicago. The southward extension of Lake Michigan carries a great waterway into the heart of the Middle West and compels east-west lines of railroad to go around it. This simple fact of geographical position makes a great lake port near its head a necessity. Location in the midst of the richest grain and stock belt of America, on the border between forest and prairie, and about midway between the Atlantic coast and the Rocky Mountains, marks the spot as an almost unrivaled center for trade.

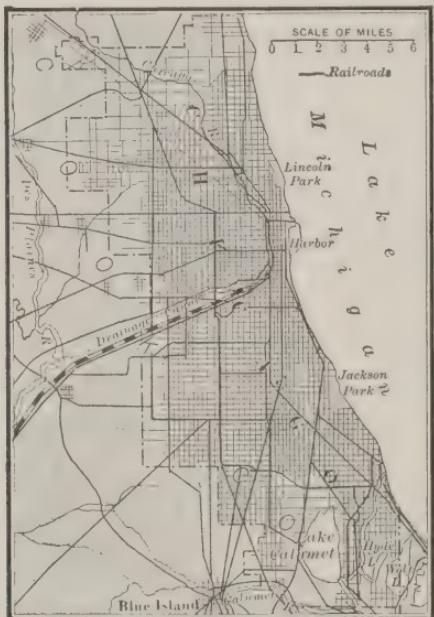


FIG. 76.—Chicago.

iron, and copper within easy reach are as extraordinary as the agricultural products and make Chicago a seat of manufacture as naturally as it is a mart of commerce.

The site of the city was fixed on the west shore by the mouth of a small river, which furnished a harbor and led by an easy portage for canoes to the headwaters of the Illinois River and to the Mississippi (Fig. 76). This route was used by the Indians and its lake end was the site of a fur-trading post and fort. It was not until after the Northwest Territory became a part of the United States, that Chicago was even a frontier village. In 1850 it had a population of only 30,000. In rapidity of growth it surpasses all records, having grown from a small town to be the second city in America and the fourth in the world within the memory of persons still living. It has

no military or political significance, not being even the capital of a state, but it is a typical example of a metropolis created wholly by economic forces. The city has spread out over a low plain of alluvial and glacial clay and lake



FIG. 77.—A business street in Chicago.

sand 25 miles long and 10 miles wide. The metropolitan district borders the lake shore for about 40 miles.

An artificial harbor has been made by building breakwaters to protect the mouth of the river, by deepening, widening, and straightening the little stream and by lining its banks with docks and warehouses. In South

Chicago, Lake Calumet forms a secondary harbor scarcely less important than the river. The two constitute one of the great shipping ports of the world, almost equaling in tonnage the foreign trade of London.

The business district (Fig. 77) is centered in an area of less than two square miles between the river and the lake, and is as crowded with buildings, vehicles, and people as any similar place in the world. The congestion has been relieved by elevated railways for passengers and subways for freight. The ground is distinctly unfavorable for the site of a city. The original surface was only seven feet above the lake, but it has been raised as much as ten feet by artificial filling. The foundations of large buildings have to be sunk 50 to 100 feet through clay to bedrock, or "floated" on artificial "pads" of concrete. Chicago was the original home of the "sky-scraper," or building of many stories sustained by a steel frame. It is now surpassed by other cities in the number and height of such buildings. Enormous grain elevators having a capacity for 65 million bushels, the largest stockyards in the world, in which 10 million animals are slaughtered yearly, extensive lumberyards and steel mills are the features most characteristic of the resources upon which the city is founded.

The residence districts lie 30 to 75 feet above the lake and are unevenly built up, including many sparsely settled areas. They contain a system of parks covering more than 3000 acres and broad boulevards along the lake shore and in a connected circuit of 60 miles. The system is planned to include, when completed, 35,000 acres.

Trade and Manufacture. — Thirty-nine railway lines make Chicago the greatest railway center in the world, and these combined with the shipping on the lake give it unequaled facilities for receiving and distributing goods. It is the largest grain market in America. Its annual wholesale trade is estimated at 1800 million dollars. The conditions which promote trade are equally favorable for manufacture, in which it is second only to New York. The value of goods manufactured in the Chicago metropolitan district is 4000 million dollars a year, or one sixth of the total for the Middle West. The leading industry, slaughtering and meat packing, yields more than one fourth of the total value of manufactures in the district. Next in order are clothing, foundry and machine shop products, printing, electrical appliances, bread, cars, confectionery, and food, which make up

more than one fifth of the whole. Rolling mills at South Chicago and blast furnaces and steel mills at Gary, fifteen miles east, are among the largest in the country. The Chicago district ranks first in blast furnace products.

Public works. — Among the notable public works of Chicago are the harbors and docks, tunnels under the river, and bridges which swing or lift to permit vessels to pass. More than 800 miles of railroad track have been elevated or depressed from street grade, and subways connect the freight stations of all the railways with the basements of factories, stores, and hotels. Even more remarkable than these are the provisions for water supply and sewerage. Water is pumped from Lake Michigan through 17 miles of tunnels leading under the lake bottom to intake "cribs" two to five miles from the shore. This device was necessary in order to secure a supply of pure water, free from contamination by the waste of the city, which was originally drained into the lake. Even this was not sufficient, and between 1892 and 1900 a drainage canal (Fig. 78) was built at a cost of \$35,000,000 to carry



FIG. 78.—Chicago drainage canal. Note the bridge which swings around the pier on the left bank to let boats pass.

the sewage away from the lake. It is 22 feet deep and 28 and a half miles long, and through it the waters of Lake Michigan flow to the Illinois and Mississippi. The canal is also used by the city for hydraulic power and may in future become a part of a ship canal leading to the Gulf of Mexico. It is already connected by a seven-foot barge canal with the Mississippi at Rock Island.

Population. — Nearly three fourths of the population of Chicago are foreign-born immigrants or the children of immigrants, and include nearly every race, language, and nationality in the world. More than half of the foreign population were born in eastern and southern Europe.

Cleveland. — The third city and second lake port of the Middle West is situated at the extreme southeastern point of the shore of Lake Erie and is the end of one of the largest strands into which lake routes divide (Fig. 73). It is the principal port of the Pittsburgh coal and iron district (p. 208), and shares with that city in the mineral industries. Its relations to the Atlantic seaports in distance and railway connections are so advantageous that a large portion of the through freight from the upper lakes is here transferred from vessels to cars. It is in a direct line and about one third of the distance by rail from Chicago to New York. Five of the great east-west railroad systems pass through it.

Site. — Cleveland is built on both sides of the Cuyahoga River at its mouth and covers the bluffs and plateau which rise 75 to 200 feet above the lake. The river valley, about half a mile wide,

admits vessels and trains to the heart of the city and is occupied by docks, depots, factories, furnaces, and lumberyards.



FIG. 79. — Cleveland.

Public Works. — The harbor of Cleveland, like nearly all harbors on the lakes, is largely artificial (Fig. 79). By the construction of breakwaters around the mouth of the Cuyahoga River and by the deepening of

its channel, more than a square mile of protected deep water and 13 miles of docks are provided. The principal streets radiate from a public square at the business center. Three viaducts, each more than half a mile long, carrying streets across the valley, are conspicuous features. Six public buildings of granite are grouped around a mall upon the bluff overlooking the lake. The water supply is pumped from an intake crib five miles from shore.

Commerce and Industry.—Cleveland is the largest market for iron ore and fresh-water fish in America. The shipping of the port amounts to 13 million tons annually. Its most important manufactures are of iron, steel, foundry products, and machinery, especially wire, nails, bolts, carriage hardware, bridges, boilers, engines, car wheels, and ships. Automobiles, clothing, meats, and oils refined from petroleum are also important products.

Detroit.—A frontier post, originally established by the French for military and trading purposes, has grown to be a peer of Cleveland among lake ports. The gap of about 80 miles between Lake Huron and Lake Erie permits the passage of railroads connecting the Middle West with southern Canada. Thus Detroit, situated upon the river which connects the upper with the lower lakes, is primarily a crossroads city, where the lake route is crossed by five east-west trunk lines of railway.

Site.—The city extends along the right bank of the Detroit River about ten miles and nearly as far inland (Fig. 80). The ground is smooth and rises gradually from the river bank. Wide avenues radiate from a focus near the river, intersecting the rectangular streets. An island in the river having an area of 700 acres forms the unique and especially attractive Belle Isle Park.

Commerce and Industry.—About 35,000 vessels pass Detroit annually, having a tonnage of about 60,000,000. Besides the through freight by rail which crosses both the Detroit and Niagara rivers to New York and New England, commerce with Canada is larger than that of any other lake port. The river is about half a mile wide, 30 to 50 feet deep, and has a swift current. Passenger and freight trains are ferried across sometimes with considerable delay, especially in winter. A double steel and concrete tunnel a mile and a half long now connects the city with



FIG. 80.—Detroit.

Windsor on the Canadian side. Detroit surpasses all other cities in the making of automobiles, the annual value of its output being about \$550,000,000. Between 1910 and 1920 its population nearly doubled, making it the fourth city in the United States.

Milwaukee.—A curved bay and river mouth on the west shore of Lake Michigan, 85 miles north of Chicago, was the site



FIG. 81.—Milwaukee, with city hall in the center.

of an early fur-trading post, which has grown into a large city (Fig. 81). The harbor and river resemble those of Chicago, but the site is naturally more favorable. The land stands about 100 feet above the lake and is intersected by three valleys which admit the lake shipping and accommodate most of the factories. The metropolitan district includes five suburban towns given largely to manufacture. There are four trunk lines of railroad, two of which ferry trains across the lake in winter.

Commerce and Industry.—Milwaukee is the commercial center

of Wisconsin and a distributing point for the northwestern states. Its shipping tonnage nearly equals that of the Chicago district. Elevators are provided for grain and storage docks for coal, both of which are very capacious. The leading industrial establishments are tanneries, packing houses, machine shops, steel mills, and flour mills. The city ranks second in the United States in the tanning of leather. Clay beds nearby furnish material for the famous cream-colored Milwaukee brick.

Nearly three fourths of the population are of foreign parentage and 34 per cent of German.

Other Lake Ports.—Some cities of moderate size are of special interest and importance. Among the lake ports are Toledo and Duluth-Superior (Fig. 82).

Toledo, on the Maumee River, near

the head of Maumee Bay, and at the west end of Lake Erie, has an excellent natural harbor, but it is off the main route of lake commerce. It is reached by the largest vessels and has 20 miles of docks. It was the lake terminus of the old Wabash and Erie, and Miami and Erie canals and is a favorable point for future connection by water with the Ohio River. Thirteen steam roads and ten electric lines give it unusual advantages for commerce. It is related to the rich agricultural district behind it much as

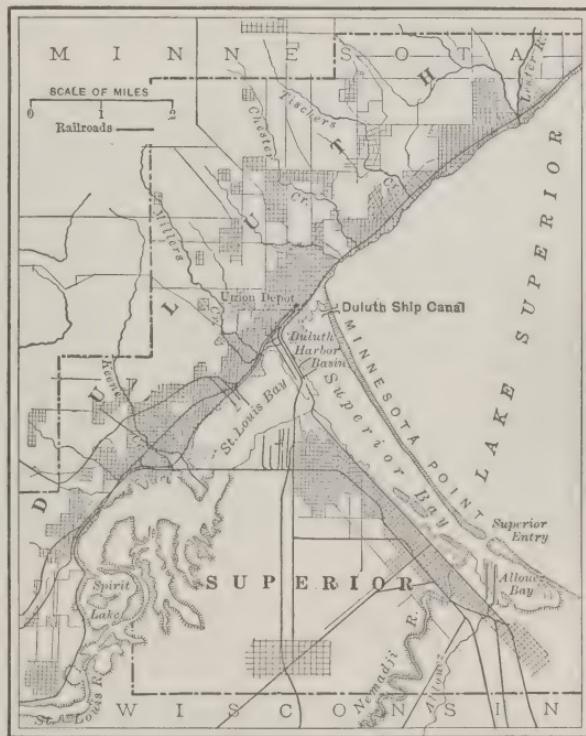


FIG. 82.—Duluth-Superior.

Chicago is to a larger area. Flour, petroleum, building supplies, plate glass, and boats are among its special lines of manufacture.

Duluth-Superior. — These twin cities in different states, on a fine harbor at the head of Lake Superior, have the distinction of being the chief shipping ports for the iron ore of the Superior district (p. 137) and the grain of the Red River valley. They are connected by two trunk lines with the Pacific

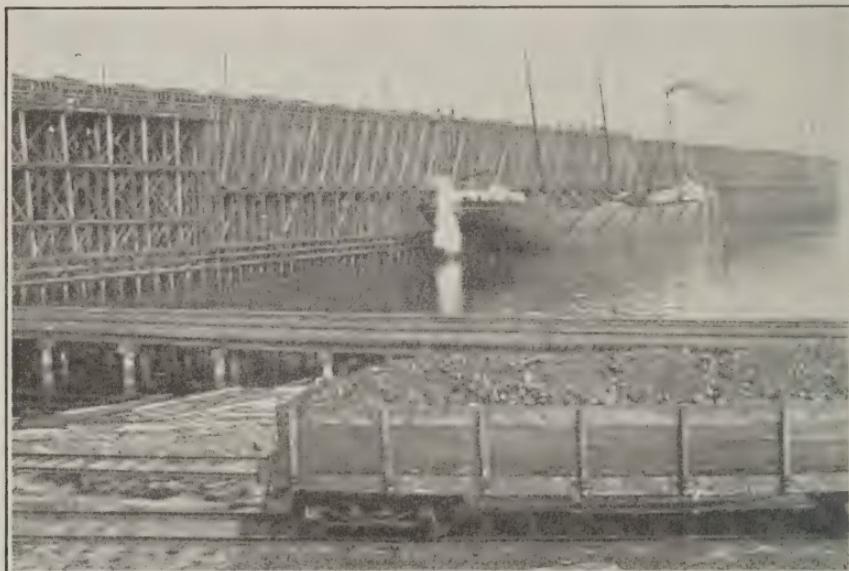


FIG. 83.—A lake vessel being loaded with iron ore at the docks of Duluth.

coast and do a large business in lumber and coal. The St. Louis River furnishes water power for flour, lumber, and steel mills. (See Figs. 82, 83.)

St. Louis. — That there should be a great city near the confluence of the three principal branches of the Mississippi system is a result of natural causes. A trading post and military station just below the mouths of the Missouri and Illinois rivers and only 150 miles above the mouth of the Ohio was established while the Middle West was British and Spanish territory. This focus of exploration and trade, where the water routes from the Appalachians, the Great Lakes, the Gulf of Mexico, the Rocky Mountains, and the upper Mississippi converge, was of prime strategic

and commercial importance. When the Mississippi basin was added to the United States, St. Louis became its metropolis. From the advent of steamboats in 1825 until the Civil War, the city enjoyed great prosperity and was a successful rival of Chicago. The closing of communication with the southern seaboard put an end to that resource, and the extension of railroads has reduced traffic by water to small importance.

Site. — St. Louis extends from a river front of 19 miles on the right bank of the Mississippi up a bluff and over a rolling upland 100 to 200 feet above the river. The natural drainage is good and the valley of a small creek furnishes an inlet for railways from the west. Roads from the east cross the "American bottoms," a part of the flood plain of the river ten miles wide, occupied in part by East St. Louis, and reach the city by two bridges about one third of a mile long (Figs. 84, 85). All passenger trains enter a Union Station which covers eleven acres and is one of the largest in the world.



FIG. 84.—St. Louis.



FIG. 85.—Eads bridge, St. Louis.

Trade and Manufacture. — St. Louis is second only to Chicago as a railway center, being a terminus of some twenty systems. The manufactures in the metropolitan district are valued at 430 million dollars annually. They include slaughtering and meat packing, boots and shoes, malt liquors, tobacco, foundry and machine shop products, clothing, iron and steel, chemicals, lumber, flour, furniture, and paints. It is a distributing point for its own products and for grain, live stock, cotton, dry goods, groceries, hardware, and agricultural implements.

Public Works. — The city park system includes nearly 3000 acres, a Botanical Garden, and a boulevard traversing the city parallel with the river. The water supply from the Mississippi is inexhaustible, and after removal of sediment is pure and healthful.

Population. — More than two fifths of the people of St. Louis are of foreign birth or parentage, and most of these are German.

Minneapolis-St. Paul. — Falls and rapids in the Mississippi at the mouth of the Minnesota, locating the natural head of navigation and a source of water power, are the features which determine the site of the twin cities of Minneapolis and St. Paul. An early French trading post, and later a fort for the control of the Indians, at the foot of the rapids, and a sawmill at the falls 12 miles above, established two economic centers, which were vigorous rivals until the development of both made them more friendly. Before the Civil War they were frontier towns dependent upon the river for communication. Railroad connections and the settlement of farm lands, especially the wheatlands of the Red River valley, led to commercial and industrial growth until the two adjoining municipalities now constitute a single metropolitan district with a division of functions.

Site. — The cities occupy the limestone bluffs and plateau about 200 feet high on both sides of the river and include a large number and variety of attractive features. Numerous glacial lakes within the city limits add beauty to the park system. The valleys, islands, and bluffs of the two rivers,

the falls of Minnehaha, the Fort Snelling Military Reservation, and Lake Minnetonka, 15 miles long, lie within the district. The natural opportunities for wide avenues, boulevards, parks, and picturesque residence sites have been fully utilized. (See Fig. 86.)

Commerce and Industry. — The two cities have the same railroad systems and are connected by a belt line for freight and



FIG. 86.—Minneapolis-St. Paul and vicinity.

by four interurban passenger lines. Nine trunk roads connect them with Chicago, St. Louis, Lake Superior, the Pacific coast, and Canada. Four of these are transcontinental. The Mississippi River is spanned by 22 bridges, varying in length from one fourth to a half mile. Minneapolis is the industrial city, famous as the greatest lumber and flour center in the world. Forty thousand horse power from the Falls of St. Anthony and 25,000 from Taylor's Falls in the St. Croix River run 22 mills, having a daily capacity of 80,000 barrels of flour. Rarely in the

world do natural resources for production, and power for preparation of products occur together so happily as the wheat fields and falls of Minnesota. Minneapolis is the greatest primary wheat market in the United States, handling more than 100 million bushels a year. The river brings down from the northern forests booms of logs from which the sawmills cut 575 million feet of lumber.

St. Paul is the capital of the state and the wholesale distributing center of the northwest. It is also an important fur market.

Kansas City. — A town at the great eastward bend of the Missouri was naturally the river terminus for the overland stage and wagon route to the southwest and California, the famous "Santa Fe trail." After a long rivalry with other cities Kansas City, at the mouth of the Kansas, or Kaw River, has outgrown its neighbors and become a rival of St. Louis. This result is not due to the river trade, which is trifling, but to 17 lines of railway which maintain its supremacy as the gateway of the southwest. The high bluffs and deep ravines have been graded for streets and buildings, while the lowlands along both rivers are occupied by freight terminals, stockyards, elevators, factories, and wholesale houses. The civil city is double, the smaller member being on the Kansas side of the Kaw and connected with the larger by a viaduct nearly two miles long from bluff to bluff. The metropolitan district is second only to Chicago as a live-stock market, and in value of meat products.

Omaha, on the west bank of the Missouri near the mouth of the Platte, was the eastern terminus of the Salt Lake and Oregon trail, over which thousands of emigrants set out on their journey across the plains. It was also the terminus of the Union Pacific, the first railroad to the Pacific coast. Nine railroad systems now cross the river at this point. Omaha is an important trade center, and it ranks next after Chicago and Kansas City in slaughtering and meat packing.

Cincinnati. — An intersection of waterways at the northern bend of the Ohio, where it approaches the Great Lakes, is a

natural location for a large city. Cincinnati covers the flood plain, terraces, and bluffs of the Ohio valley and has a river frontage of about 14 miles. The low bottom lands are subject to floods, but on account of convenience for river trade are occupied by factories and wholesale houses. The retail business district is largely situated upon a terrace about 60

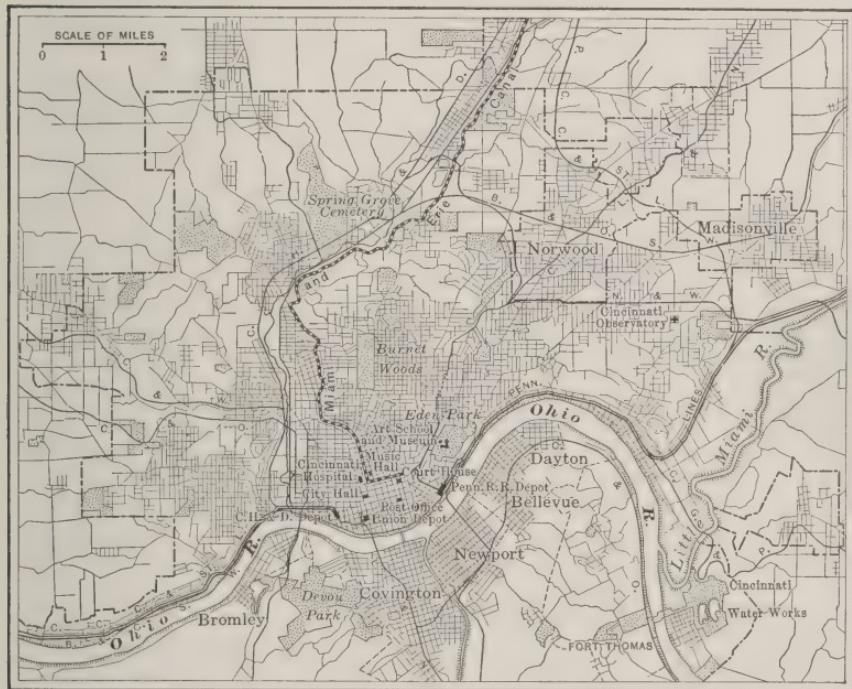


FIG. 87. — Cincinnati.

feet above low water. The residence districts occupy a higher terrace and bluffs, 400 to 460 feet high, commanding views of the valley, river, city, and surrounding heights. (See Fig. 87.)

The Kentucky towns on the south side of the river, Covington and Newport, are connected with the city by bridges nearly half a mile long and are included in the metropolitan district. Cincinnati formerly owed its prosperity to the business brought by the river and by the Miami and Erie

Canal from Toledo, but its railroad connections are now far more important. It is reached by six east-west trunk lines and an equal number of roads to the north and south. The city has the distinction of having built for itself, as a municipal enterprise, the Cincinnati Southern Railway to Chattanooga. The river trade in coal, iron, and lumber is still large. The United States Government is building a series of dams in the Ohio which, when completed, will maintain a depth of nine feet, and increase river transportation.

Industries. — Previous to the Civil War, Cincinnati was famous for pork packing, but has long been surpassed in that by Chicago. The special lines of manufacture in the metropolitan district are now clothing, boots and shoes, wagons, furniture, soap, tobacco, and artistic pottery. The city is noted for its zoölogical garden, art museum, music hall, annual musical festivals, and its municipal university, established and maintained by the city for the free tuition of its youthful citizens. Some of these institutions are due to the large population of German descent, which forms nearly one quarter of the whole.

Louisville. — The so-called "Falls of the Ohio," really rapids where the Ohio descends 26 feet in two miles, determine the location of Louisville. It is built upon a gravel plain 60 feet above low water and inclosed by bluffs. It is the metropolis of Kentucky and an important river port and railroad center, having five east-west and four north-south lines. Three bridges connect it with New Albany and Jeffersonville on the Indiana side of the river. It handles more tobacco than any other American city. The value of tobacco manufactured equals \$16,000,000 annually.

Indianapolis. — The best example of a strictly inland railroad center in America is Indianapolis. It was located in the woods near the center of Indiana by legislative act as the state capital. It has neither waterways nor water power, but is near the Eastern Interior coal field (p. 194) and in the midst of a rich agricultural region. It is a creation of the railroads of which 15 lines of steam road and 12 of electric interurban road radiate from it like the spokes of a wheel. As a manufacturing and distributing center it has no inland equal in the Middle West. Its economic, political, and social influence in the state is greater than that of any other state capital.

Summary. — Cities are the most complex of economic products, but the reasons for their existence, in each case, can be

easily discovered. The necessary conditions are productive territory and accessible site. They are reservoirs of concentrated population and wealth. The Middle West has seven first-class cities and over 250 smaller ones. Chicago is the second city in the United States in population, manufacture, and commerce. Cleveland, Detroit, and Milwaukee are great lake ports. St. Louis, Cincinnati, and Minneapolis-St. Paul are the largest river ports.

Economic Rank of the Middle West.—The Middle West, considered as an economic unit, belongs to the fourth and highest class of complex societies (p. 93) and in this respect resembles the United States as a whole more than does any other economic region.

QUESTIONS

1. What are some of the advantages of city life as compared with life in the country? the disadvantages?
2. Is there usually room enough in the principal business streets of a city? How can more room be utilized?
3. Describe the features of an ideal city street.
4. Compare the advantages of the usual rectangular pattern of city streets with those of the spider-web plan, in which the main streets radiate from a central space.
5. To what uses are river banks commonly put in cities?
6. What is meant by "the smoke nuisance"?
7. Why do most of the citizens of every city want it to grow larger?
8. Why must a large city be constantly supplied from the country not only with food and raw materials but also with people?
9. If the urban population of the Middle West ever greatly exceeds the rural, to what class of economic societies will it then belong?
10. Why does the Middle West represent the highest class of economic societies?

CHAPTER XV

THE EASTERN STATES

Boundaries. — The natural boundaries of this economic region are on the east the Atlantic Ocean and on the north the St. Lawrence River and lower Great Lakes. On the west the region extends to the upper Ohio River and the edge of the Cumberland Plateau. The southern boundary is climatic and therefore indefinite, but is near the limit of seven months without frost and of the cotton belt. It includes the six New England States, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island, the seven so-called Middle States, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, and West Virginia, and the District of Columbia¹ (Figs. 30, 33, 35, 88).

The Eastern States contain the largest commercial centers and industrial districts of the United States, and are consequently more densely populated than any other region. While the area is less than one twelfth of the United States, the population is more than one third. The urban population amounts to 70 per cent and of employed persons 40 per cent are engaged in manufacture (Figs. 34, 36, 37).

Economic Character. — The economic character of the region is due almost wholly to natural causes.

1. *Location.* — Every state except three has a seaboard on the Atlantic, deeply indented with bays and inlets, which admit the tide far up the valleys and form some of the most commodious harbors in the world. These ports

¹ The group of the Eastern States corresponds to the New England and Middle Atlantic groups of the Census Bureau with the border states of the South Atlantic group added.

are about 3000 miles, or five to ten days' voyage by steamer, from the ports of Europe.

2. *Relief and Structure.* — About two thirds of the area is a moderately rugged highland, diversified by knobs, knots, and ridges, which are the stumps of worn-down mountains. This highland contains the most valuable beds of coal in America. The streams flowing from it have steep slopes and narrow valleys, and are, therefore, available for water power. The numerous glacial lakes act as storage reservoirs to equalize the flow of streams.

3. *Forests.* — The region was originally covered with coniferous forest in the north, changing gradually through mixed forest to deciduous hard-wood timber in the south.

4. *Food Supply.* — Easy routes of communication by land and water with the Middle West insure a large and constant supply of food for the people who can produce little.

5. *Labor Supply.* — Millions of immigrants from Europe land at the Atlantic ports and furnish an abundant supply of cheap labor.

6. *Markets.* — Ocean vessels, lake vessels, canal boats, and railroad trains transport raw materials and finished products, by land and water, to and from the greatest markets of the world.

Relief. — *The New England Plateau.* — The northern part of the Appalachian Highland (Fig. 33) east of the Hudson River and north of the Mohawk consists of the New England Plateau and the Adirondack Mountains, which are remnants of old mountain ranges from which layers of rock, thousands of feet in thickness, have been removed. The last important work of the agents of erosion was done by continental ice sheets, which wore off the sharp points and angles, rounded the summits, and rubbed down and polished the whole surface. Valleys were deepened into hollows and dammed with drift. These basins hold the waters of thousands of small lakes. The higher places were swept nearly bare of mantle rock and the drift left on the slopes is thin and coarse. The surface is in many places thickly strewn with boulders.

In northern New England the hills are large, rising here and there to mountainous heights which occur generally in isolated knots. The Katahdin group in northern Maine, the

White Mountains of New Hampshire, and the Adirondacks of New York contain peaks about one mile high (Mt. Washington 6279 feet). The Green Mountains of Vermont are lower and form a range extending southward into Massachusetts and northward into Canada. In southern New England the plateau is nearly level-topped, with a gentle slope to the south, and is dissected by narrow valleys into a surface of moderate roughness. The glacial drift is ridged up into many parallel, half-melon shaped hills called drumlins. The region is crossed by two great valleys. The Connecticut valley south of Vermont is cut out of soft rocks to a width of several miles. The Hudson-Champlain valley in New York is a continuous depression forming a gap through the highland and an easy route by land or water from the sea to the St. Lawrence. The Mohawk valley is a similar and even more important pass westward from the Hudson to lakes Ontario and Erie.

The Northern Appalachians. — South of the Hudson-Mohawk gap, the highland consists of a central mountain belt flanked by a plateau on each side. The central belt, 50 to 75 miles wide, consists of hundreds of parallel ridges and valleys which occupy southeastern New York, northern New Jersey, eastern Pennsylvania, and western Maryland and Virginia. The ridges have smooth, symmetrical slopes and even crests, and extend in straight or gently curved lines, like a wall. They are 10 to 50 miles long and 1000 to 4000 feet high. South of the Potomac River, the easternmost ridge is more massive than the others and is called the Blue Ridge. It is separated from the other ridges by an unusually wide interval known as the Great Appalachian Valley.

The Plateaus. — The central belt is bordered upon the west by the *Appalachian Plateau*, which occupies southern New York, western Pennsylvania, and West Virginia. The general surface slopes gently northwestward to the plains of central Ohio and Kentucky, but is deeply dissected by the tributaries of the Ohio, and is the roughest and most difficult part of the highland

(p. 37). The abrupt eastern edge of the plateau is called in New York the Catskill Mountains, in Pennsylvania and Virginia the Allegheny Mountains, and in Kentucky and Tennessee the Cumberland Mountains.

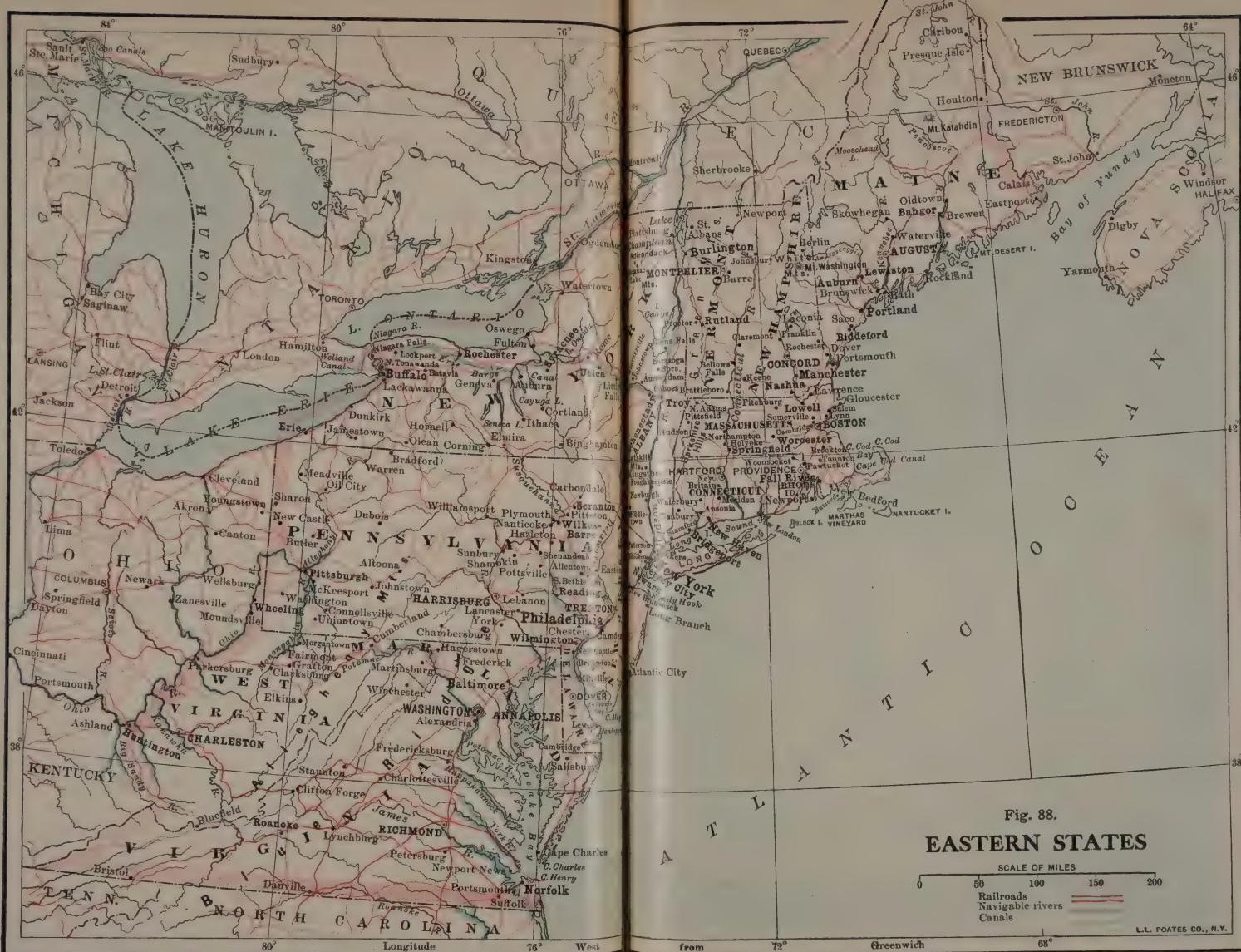
East of the Blue Ridge, the low *Piedmont Plateau*, 25 to 125 miles wide and resembling southern New England, extends from New York to Alabama. The seaward margin of the plateau is marked by the *Fall Line*, where falls or rapids occur in every stream which crosses it.

The Plains. — The space between the Fall Line and the coast is occupied by the *Coastal Plain*. It has been recently elevated above the sea and is covered with soft and unconsolidated sediments. Its slope is so gentle that the streams which cross it are sluggish and admit the tide far inland. Hence this plain is often called the tidewater region.

The Lake Plain. — In New York, Pennsylvania, and Ohio the space between the northern edge of the Appalachian Plateau and lakes Ontario and Erie is a plain of glacial drift and lake silts. In New York the drift is heaped up into thousands of drumlins, and the plateau edge is cut by deep, narrow valleys opening northward, which contain the basins of the Finger Lakes. This region is one of the best for fruit, grain, and potatoes.

Soils. — In contrast with the Middle West, where the surface and soil are nearly uniform over large areas, the Eastern States present a great variety in a small space. South of the glacial boundary (Fig. 33), the soil varies with the kind of bedrock beneath it, being generally poor on sandstone and good on shale and limestone. On the high mountains and steep slopes, there is little but bare rock, and on the hills and ridges the soil is generally poor and thin. Most of the Coastal Plain is too sandy to be productive. The Piedmont Plateau has soils derived from granite which are good for wheat, tobacco, and cotton. The valleys between the mountain ridges are broad and fertile.

Drainage. — The principal streams of the Eastern States rise near the inland border of the region and cut across the plateaus



and ridges to the sea. The gateways by which they flow through the ridges are called water gaps and afford easy passage for railroads and canals. Their lower valleys are all drowned below sea level and admit shipping far inland. Thus the river valleys bring together the traffic of land and sea. In Maine, the Penobscot and the Kennebec drain tangled chains of lakes and reach sea level at Bangor and Augusta, each about 50 miles from its mouth. Although the Connecticut is the longest river in New England, it is of little use for navigation. The lower Hudson is not a river, but a deep arm of the sea as far as Troy, 150 miles from New York Bay. The lower seventy miles of the Delaware River is a bay admitting the largest vessels to Philadelphia. The drowning of the Susquehanna and its tributaries has made Chesapeake Bay with its arms, extending ocean navigation to Baltimore, Washington, and Richmond.

Coast Line. — The subsidence or drowning of the coast has made it much indented. The New England coast is generally rock-bound except around Cape Cod Bay and peninsula. In Maine it is broken by fiords, or deep, narrow channels, into peninsulas and islands. Harbors are very numerous and some of the smaller ones are most useful, as Portland, Portsmouth, Gloucester, Boston, and Narragansett. Cape Cod Bay and canal, Buzzards Bay, and Long Island Sound constitute an "inside passage" between New York and New England ports. New York Bay accommodates more shipping than any other harbor in the world. From Long Island southward the coast is low and sandy. The mainland is bordered by marshes and shallow lagoons, outside of which sand bars thrown up by the waves form an almost continuous barrier beach. Such a coast would shut out ocean commerce if it were not broken by the great inlets of Delaware and Chesapeake.

Climate. — The climate of the Eastern States does not differ much from that of the eastern part of the Middle West in the same latitudes. The highlands are colder and have heavier

rainfall than the lowlands around them. In the north, the winters are severe on account of the north and northwest winds which bring cold air from the interior. The summers are warm because the winds are west and southwest and bring heated continental air to the coast. The moderating influence of the Atlantic Ocean is slight. New York and New England lie in the track of most of the cyclonic storms that sweep across the continent and bring in winter heavy falls of snow. The annual rainfall varies from 30 inches in the northwest to about 50 inches on the coast (Fig. 29). About one half of it falls in the growing season, which increases in length from five months in the northwest to seven months in the southeast (Fig. 30). A cold current washes the coast as far south as Cape Cod and helps to produce much cloudy and foggy weather.

Summary. — The Eastern States form a small but populous economic region, comparatively unfavorable for agriculture, but having every advantage for manufacture and commerce.

QUESTIONS

1. Which of the natural conditions given on page 81 is absolutely indispensable for the existence of great manufactures in the Eastern States? for the existence of large commerce?
2. If the coast line lay along the foot of the highlands, what difference would it make in the economy of the Eastern States?
3. How do the streams of the Eastern States help manufacture and commerce?
4. How does nearness to Europe affect the life and character of people in the Eastern States?
5. What natural conditions in the Eastern States favor an excess of urban over rural population?

CHAPTER XVI

THE EASTERN STATES: MINERAL AND FOREST PRODUCTS

Coal. — The economy of the Eastern States is based upon mines, water power, and the sea. Among mineral products, coal used for power and in metal working is far the most important. While water power and wind power were used for ages before coal was burned and are still used in many localities, the industry and commerce of the present time are almost entirely

dependent upon coal. Without it factories could not be run, railroads and steamships would be tied up, cities at night would be in darkness, and their inhabitants would be idle. Industrial communities would face starvation because their food supplies must be brought from regions hundreds or thousands of miles distant. If unemployed, they would have no means of buying what might be at hand. To

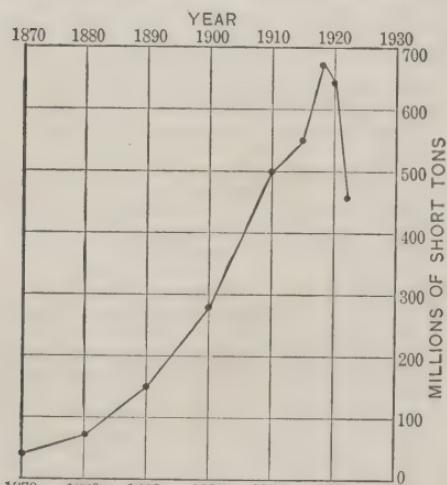


FIG. 80.—Production of coal in United States, 1870-1922.

the human life of the Eastern States, coal is as necessary as bread.

The first coal used in America was from a small field near Richmond, Va. The quantity mined in the United States has increased in a century from 50,000 tons a year to more than 500 million tons, or five tons for every man, woman, and child

(Fig. 89). This amounts to about two fifths of all the coal used in the world.

The Appalachian coal field (Fig. 96) covers western Pennsylvania, eastern Ohio, West Virginia, and eastern Kentucky, and extends through Tennessee to central Alabama. The *bituminous* or soft coal of this field is of excellent quality for making steam in engine boilers. The total quantity mined in 1922 was 480 million tons, of which the Eastern States produced more than half.

Bituminous coal occurs in horizontal beds or seams, of which there are usually many underlying the same area. The seams vary in thickness from a few inches to fifteen or twenty feet, but a seam less than four feet thick is difficult to work. Coal seams sometimes outcrop (Fig. 90) on the sides of a



FIG. 90.—Outcropping seam of coal in Pennsylvania.

valley and are worked by direct tunneling. Usually shafts are sunk to reach them and "drifts" or tunnels are run at different levels in all directions. The coal is broken up by drilling and blasting, drawn on small cars to the shaft, and hoisted to the surface. In some mines, mules are used to draw the cars, but in a well equipped mine, electric power, generated by an engine at the surface, is used for hauling, hoisting, pumping out water, blowing in air for ventilation, and lighting the mine. If the overlying rock is not strong,

timbers must be used to support the roof of the mine. Also for this purpose, pillars of coal are left between the "rooms" or spaces excavated. These cannot be removed and from one fourth to one half of the seam is thus left in the ground. Such waste is sometimes avoided by filling the space with earth and broken rock.

Anthracite, or hard coal, is much heavier than bituminous, and its value per ton is about twice as great. It burns with little smoke or flame and makes a very hot fire. It occurs in a region of much disturbed and folded rocks in northeastern Pennsylvania occupying only 480 square miles. Some of the seams are 50 feet thick and outcrop at the surface. Anthracite is mined in the same way as bituminous coal, but after being hoisted to the surface it has to be assorted partly by hand (Fig. 91). The production is about 90 million tons, annually. Pennsylvania anthra-

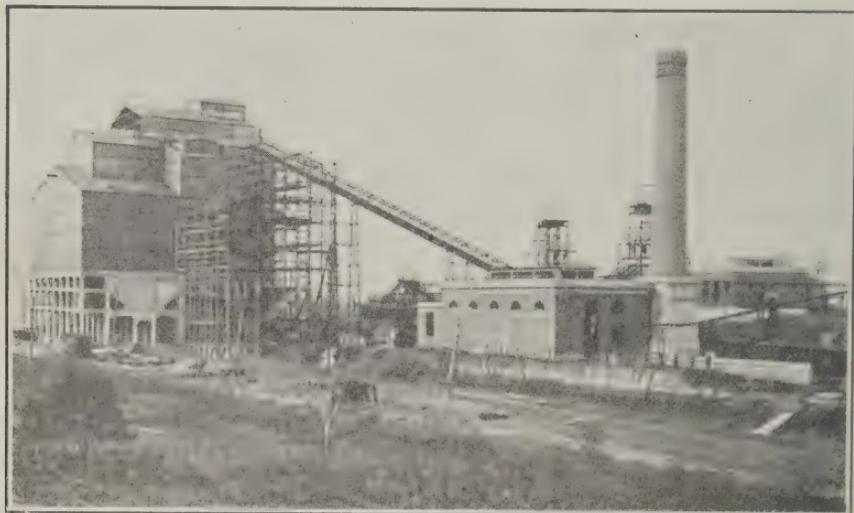


FIG. 91.—Power house and breaker of an anthracite mine, Pennsylvania.

cite is carried by rail to the Atlantic seaports and thence by water to New England. In the Eastern States it is used for domestic purposes almost to the exclusion of soft coal. The city of New York uses about 12 million tons a year. Anthracite also

goes to the Great Lake ports and is thence distributed through the Middle West, where on account of the cost of carriage it is a luxury.

The bituminous coal of the Appalachian field is distributed all over the Eastern States for use in the boilers of stationary and locomotive engines. It is floated in barges down the Ohio and Mississippi rivers, and carried by rail and water as far as the western lake ports. Steam coal and the coke made from it sustain the iron manufacturing districts from Pittsburgh and Buffalo to Chicago and Duluth.

Coke and Gas. — About one seventh of the bituminous coal is made into coke by heating in retorts or ovens (Fig 92). Gases are driven off and a solid fuel, which is harder and makes a hotter fire than natural coal, remains. It is indispensable in the smelting of iron. The gases are in most cases wasted, but in cities are purified and used for lighting and cooking. Coal tar and ammonia may be extracted from them. Coal of inferior quality is heated to make "producer" gas, which can be used without purification in gas engines and furnaces. "Culm and slack," waste products of the mines too finely divided for ordinary use, may be compressed into "briquettes" or lumps of any convenient size and thus made available.

Coal tar, formerly a waste product, is now the source of a very large number of drugs, dyes, and chemicals of the highest importance in the manufacture of medicines, textiles, knit goods, and explosives. The coal-tar industry has been most highly developed by the Germans, who have hitherto held almost a monopoly of the business.

Nearly half the coke is now made in "by-product" ovens, from which the tar and gases, formerly wasted, are saved for the manufacture of dyes and chemicals.



FIG. 92.—Coke ovens.

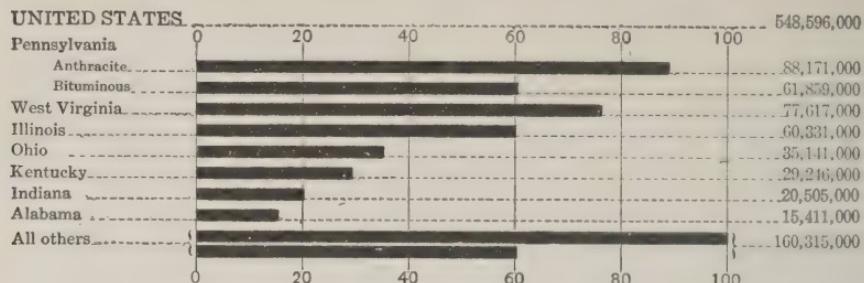


FIG. 93.—Production of coal, by states (1919), in millions of short tons.

Coal Fields of the United States.—The coal fields of the United States are the largest and most productive in the world. (See Figs. 23, 96.) They cover 496,000 square miles and are estimated to contain 3,000,000 millions of tons. They are divided into six provinces:

1. *The Eastern Province* includes the Appalachian field and lies in the states of Pennsylvania, Ohio, West Virginia, Kentucky, Tennessee, Alabama, Virginia, and North Carolina. It furnishes 65 per cent of all the coal mined.

2. *The Interior Province* includes several distinct regions. The Eastern Interior Region in Illinois, Indiana, and Kentucky furnishes about 23 per cent, and the Western Interior Region in Iowa, Missouri, Nebraska, Kansas, Arkansas, and Oklahoma 3 per cent. The Northern Interior Region in Michigan, and the Southwestern in Texas are of less importance.

3 and 4. In the *Gulf Province* in Alabama, Mississippi, Louisiana, Arkansas, and Texas, and the *Northern Province* in North Dakota, South Dakota, Wyoming, and Montana, the coal is of an inferior quality called lignite.

5. *The Rocky Mountain Province* in Montana, Wyoming, Utah, Colorado, and New Mexico furnishes about 4 per cent. some of which is anthracite.

6. *The Pacific Coast Province* in Washington and Oregon is of small extent and value.

In general the quality of the coal declines from east to west. Nevertheless, it is all of great local value and importance, and

maintains industry and transportation from the Atlantic Ocean to the Rocky Mountains.

Mining and Miners.—Coal mining is a somewhat undesirable and dangerous occupation. Few men would prefer to work in dark, damp chambers underground. Currents of fresh air must be blown through the mine to prevent the accumulation of gases, which may smother the miners or explode with great violence and loss of life. In the Eastern States, the mines are worked almost entirely by foreign immigrants and their immediate descendants. It is a great field for unskilled labor at wages which are larger than can be obtained in older countries. In many cases the miners occupy houses built and owned by the company which employs them, and depend upon company stores to supply their wants. In the Appalachian Plateau the mines are generally difficult of access. The railroads follow the narrow valleys and ascend steep grades to reach the coal outcrop. There is not room in the valley bottoms for houses, which are consequently perched on the slopes.

The exact methods by which mining shall be done, the hours of work, the amount and time of payment of wages, the provisions for safety of life and limb, the housing of the miners and their families, the sanitary and educational conditions of a mining community (Fig. 95), all give rise to many problems which are difficult of adjustment, and lead to strikes in which all or most of the miners refuse to work until the matters in dispute are settled. The miners have generally organized themselves into unions, the members of which are bound to support one another, and to prevent men who do not belong to the union from being employed. The economic life of the whole community is so dependent upon a large and constant supply of coal that a general strike of the miners, interfering with industry and transportation, is a serious calamity. The courts of law and sometimes the military forces of



FIG. 94.—Total mineral production of United States, 1880–1922.

the state are called upon to protect property and preserve order until the miners and their employers can come to an agreement.



FIG. 95.—Coal-mining town in West Virginia.

Petroleum.—Oil is obtained from wells drilled into bedrock, generally several hundred or even a thousand feet or more in depth. It has accumulated in porous strata along with gas and salt water. If there is a cover of impervious rock, the gas pressure is in many cases sufficient to drive the oil out, producing a flowing well or "gusher." Most wells have to be pumped sooner or later, and in time the oil is exhausted and the well yields only salt water. The crude oil from the well is a thick, dark colored, and ill smelling liquid. It is stored in steel tanks or temporarily in open pools, and pumped through pipe lines laid underground to refineries. By heating the oil and cooling the vapors given off, it is split up into many products, of which gasoline, kerosene, lubricating oil, and solid paraffin and asphalt are the most important.

Kerosene, the product extensively used for lighting, has largely displaced all other illuminating oils in every continent. Perhaps no other utensil

has contributed so much to the comfort and welfare of millions of families as the coal oil lamp. *Gasoline* has in recent years become scarcely less important on account of its use in engines which require no furnace or boiler, and obtain their power directly from the fuel without the intervention of steam. They make possible this age of the automobile, auto truck, motor boat, motor cycle, and aéroplane. The gas engine has displaced the steam engine and the windmill for many purposes. The invention of the Diesel marine engine makes it possible to burn crude oil in the place of gasoline and to reduce the cost of transportation by water. Engines are also coming into extensive use in which crude petroleum is consumed for making steam. In southwestern United States, where coal is lacking, petroleum is used for firing locomotive engines. Modern warships are equipped for oil fuel because it takes up less space than coal and is more conveniently handled.

Oil Fields. — The first oil wells in the United States were bored in Pennsylvania about 1860. The Appalachian field was extended to southwestern New York, eastern Ohio, and western West Virginia, and reached its largest yield between 1880 and 1900. During this period, it furnished from 100 to 50 per cent of the total product of the United States. Between 1885 and 1905, a field in western Ohio and eastern Indiana was very productive. Since 1900, wells in Texas, Kansas, Oklahoma, California, and Illinois (Fig. 96) have equaled or surpassed all previous yields. The "life" of an oil field, or its period of great productiveness, lasts from a few years to about twenty-five years. Although new fields should be discovered, the supply of petroleum in the United States can hardly be expected to remain plentiful longer than about a century. It is impossible to foresee what will be used for lighting and lubrication when the petroleum is exhausted. In engines alcohol may be used instead of gasoline.

Petroleum is transported in tank cars, tank steamers, and pipes. About 50,000 miles of trunk pipe line connect the oil fields with Atlantic and Gulf seaports and ports on the Great Lakes. Extensive oil refineries have been established near Chicago and Cleveland, and at Bayonne, N. J.

Among foreign oil fields, the Russian along the Caucasus Mountains and the Mexican are the only ones that rival those of the United States.

Of the world supply, the United States furnishes about 65 per cent and Mexico about 20 per cent.

Refined oil ranks second in value among exports from the United States and shares with American cotton and copper the distinction of being a product which the world could hardly do without. American oil goes to almost every part of the world except Russia, and in some countries the empty cans in which it has been received are prized for domestic use.

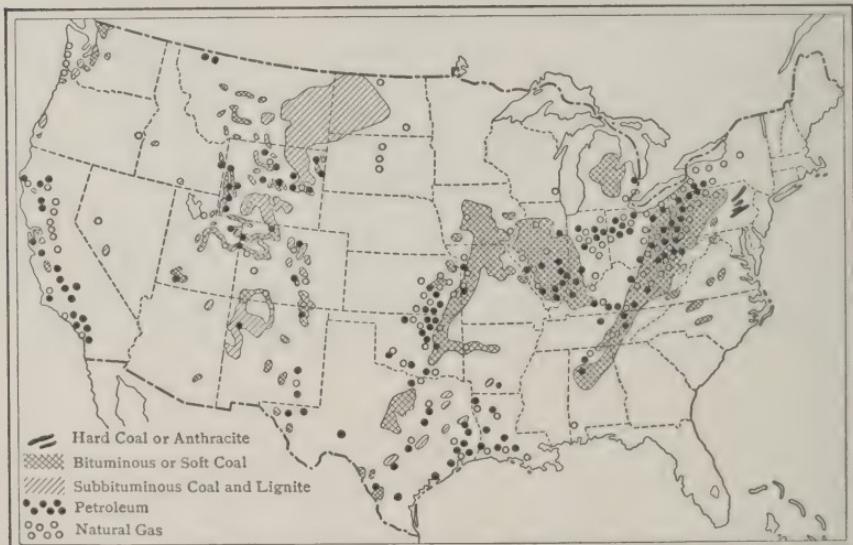


FIG. 96.—Fuel resources of the United States.

Natural Gas.—The best and cheapest of all fuels is gas, because of its high heating power, cleanliness, and convenience. It usually escapes from wells before the flow of oil begins. The first gas wells to be utilized were in western New York and Pennsylvania, and later in Ohio, Indiana, West Virginia, and Oklahoma (Fig. 96). Gas has greatly stimulated manufactures in the gas fields, especially of glass and iron, and has been piped to all the principal cities for boiler and domestic use. Storage of gas is difficult, and probably one half of the whole supply has been wasted. The life of a gas well is short, and any field is likely to be exhausted in twenty years. This addition to the already liberal supply

of fuel in the coal and oil fields cannot be expected to prove more than temporary.

Brick, Stone, and Cement. — In the development of a forested country like the Atlantic division of the United States, buildings are almost exclusively of wood. The log cabin of the pioneer could be completed without the use of a nail or any other metal, the only mineral matter required being the hearthstone and mud for a chimney. The wooden frame house still prevails throughout the country. It is relatively cheap, very comfortable, and, if cared for, durable. Its worst defect is its liability to destruction by fire. In the arid and semiarid parts of the world and in old and densely populated countries, wood is scarce and costly, and building materials are obtained chiefly from the earth crust. In western Europe, wooden houses are rare or of local occurrence, as in Switzerland and Norway. Field and quarry stone are used wherever available, and in other places brick. Houses are built to stand for centuries, and fires are infrequent. In the United States, until recently, brick and stone have been used chiefly in the business districts of cities and for large public buildings. Probably nine tenths of the homes are still within wooden walls. The scarcity and high price of lumber have brought at least the Eastern States to a period of change and a rapidly increasing use of brick, stone, and cement.

Brick. — Clay suitable for making common brick is widely distributed, so that almost every community has its own brickyards. The output is roughly proportioned to the density of population, and, therefore, is greatest near large cities. The most extensive brick industry is carried on in the Hudson valley. Numerous deposits of clay made by former streams emptying into the Hudson estuary have been raised by crustal movements 100 to 300 feet above tide. The output of the Hudson district is one tenth that of the whole United States. The bricks are floated on barges to build the great city of New York, which requires 1000 million every year. The clay is thoroughly kneaded, mixed with a little sand, run into molds, dried, and burned in a kiln. Pressed brick, vitrified or specially hardened brick, and brick of peculiar colors are used for facing fine houses. Fire brick made

from clay which underlies coal seams is used for lining furnaces and stoves. In many works, shale rock is ground and made into paving brick, tile, and sewer pipe.

Stone. — Good building stone is less common than brick clay, and it costs more to quarry it than to make brick. Hence stone is not used so much as brick, except in foundations. The cost of transportation usually confines the use of stone to a territory not far from the quarry. Yet there are some varieties which, on account of their beauty, durability, or other peculiar quality, find a wide market in spite of their cost. Among these are granite, slate, and marble. In the last ten years, the value of the building stone used in the United States has increased 65 per cent.

Extensive erosion in the Appalachian plateaus and mountains has exposed on the surface many rocks not found on the plains. The value of the quarry products of the Eastern States is nearly one half that of the whole United States.

Granite. — The "granite hills" of New England contain inexhaustible resources of rock of excellent quality, much of which is so near the coast that it can be shipped by water. Vermont, Massachusetts, Maine, and New Hampshire produce more than 40 per cent of the total output. The hardness of granite makes the work of quarrying, cutting, and dressing difficult and costly, but the rock takes and retains a high polish which brings out a mottled pattern of colors. It is used chiefly for columns, arches, trimmings, and other ornamental parts of buildings and for monuments. The gray, reddish, and other mottled stones in cemeteries are varieties of granite. A very durable pavement is made of granite blocks.

Slate occurs only in regions where the earth crust has been subjected to great disturbance. It splits naturally into thin, smooth sheets which form first-class material for roofing table tops, and blackboards. It is more easily quarried and worked than granite, and is shipped long distances, even across the ocean. The Eastern States have a monopoly of slate production, Pennsylvania and Vermont furnishing nearly nine tenths of the whole supply.

Limestones are abundant and widely distributed rocks, exhibiting a great variety of qualities and colors. They are all relatively soft and

easily worked, and the best are beautiful and durable. They nearly equal in value all other quarry products combined. Large quantities are "burned" or heated in kilns for the manufacture of mortar and cement. The limestone most widely used for building is the Bedford stone of southern Indiana, which can be quarried in solid blocks of almost any thickness, cut with wire saws, and turned in a lathe (Fig. 97). It is shipped to nearly every state and even to Europe.

Marble is a compact, crystalline limestone, highly valued for its color, fine grain, and surface when polished. Large buildings are sometimes built of marble, but it is used chiefly for ornamental work. The most productive marble quarries are at Proctor, Vt. (Fig. 98). The finest statuary marble is imported from Carrara, Italy.

Sandstones are quarried in great variety but are of less value for building than other stones. Some from Ohio rival the finest limestone. Many of the best are brown or reddish in color and known as brownstone.

Trap, a volcanic rock, occurs in dikes or walls cutting through other rocks, notably in New Jersey and Connecticut. When broken in pieces of proper size, it forms excellent road metal.

The economic importance of common *sand* and *gravel* used in building and road making should not be overlooked. Complete statistics are not available, but they exceed in quantity used, and perhaps in value, all other nonmetallic minerals except fuels.

Cement. — The increase in the use of cement (p. 142) from about one million barrels a year in 1895 to more than 100 million barrels in 1920 is one of the most significant events in the economic development of the United States. It is a direct and fortunate answer to the serious scarcity and increasing cost of timber. Improvements in methods of manufacture have reduced the cost of cement from three dollars to less than one dollar a barrel.

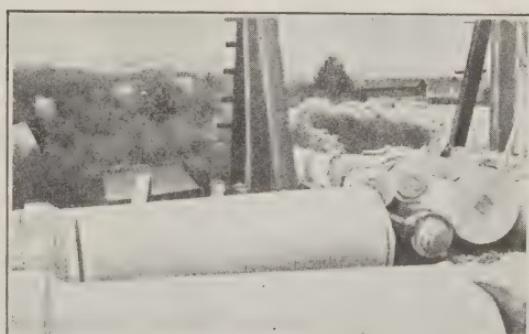


FIG. 97. — Limestone columns turned in a lathe, Bedford, Indiana.



FIG. 98. — Marble quarry, Proctor, Vermont.

The cement industry, like brick making, is widely distributed because lime, clay, and fuel can be had in almost every state. The demand for cement is greatest in large cities and the production is largely controlled by density of population. Pennsylvania has led all the states from the first; Indiana has recently acquired second place. The Eastern States produce over one third of the total output. When the United States Government undertook the construction of the great Roosevelt dam and irrigation canal in Arizona, it established a cement factory on the spot. Such an expedient is likely to be repeated almost anywhere, when the occasion arises.

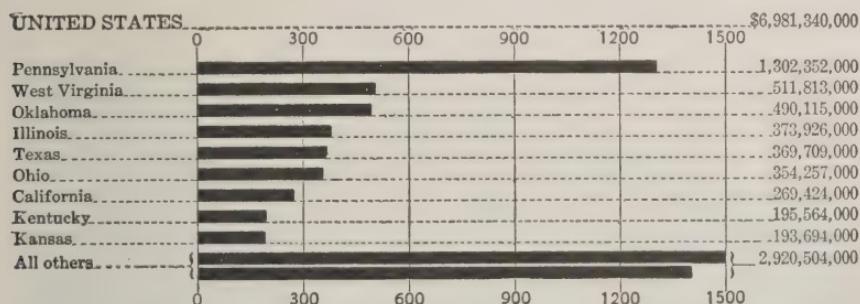


FIG. 99.—Value of minerals produced by states (1920), in millions of dollars. (See Table VI, Appendix.)

Forest Products.—The use of wood for fuel and construction is universal, and it is difficult to imagine how men could live without it. Forests naturally prevail from the equator to the arctic circle and from sea level to high mountain crests, covering more than one half the land area. Large trees will grow on soils and slopes where nothing else of value can live. The great northern coniferous forest (Fig. 61) originally extended over the Eastern States, becoming mixed with hardwood trees toward the south.

The history of the settlement of the region is a story of struggle with the forest which had to be cleared to make room for crops. This struggle lasted about two centuries, at the end of which forest destruction had progressed so far that the demand for timber and lumber exceeded the home supply. Since 1870 the upper lakes region of the Middle West, and the Southern States have supplied the deficiency. As the yield of the lakes region

has decreased that of the south has increased and there is now a large shipment from the Pacific coast. About 40 per cent of the total forest product is used for firewood and nearly as much for lumber, while poles, fencing, and railroad ties are large items. About one eighth is ground into pulp for paper making.

Forest Conservation. — The increasing demand for wood in many forms can be met in two ways: (1) by the substitution of other materials in the place of wood, and (2) by the conservation of forests. Of substitution, the use of coal for fuel, of steel, brick, cement, and concrete (Fig. 100) for build-

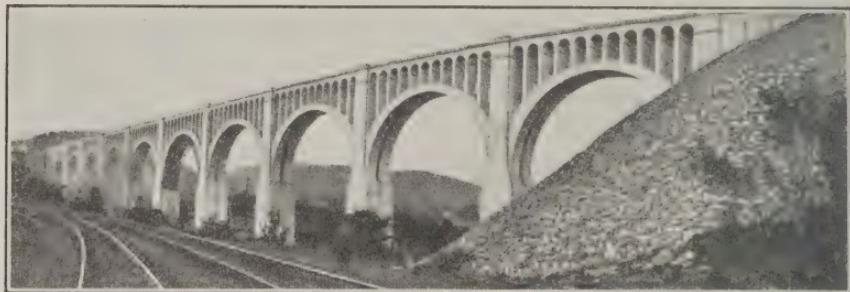


FIG. 100.—A concrete railroad bridge. Tunkhannock viaduct, Pennsylvania.

ing, of wire for fencing, of glass or metal for ties, and of steel for cars and furniture, are examples. Conservation means the cutting of timber without waste or injury to standing trees, the prevention of forest fires, and the re-planting of land already cleared, much of which is useless for other purposes. Limbs and tops of trees may be converted into charcoal or distilled for wood alcohol. A forest or wood lot should receive the same intelligent care as an orchard. Only by the practice of the art of scientific forestry can the future timber supply of the United States be made to meet the demand. Without it the country will soon be dependent upon Canada or some other foreign source. The Eastern States still furnish nearly 15 per cent of the forest products of the United States. (See Fig. 101.)

Summary. — The Eastern States contain the richest anthracite field yet worked in the world and one of the best bituminous coal fields. These, together with petroleum, natural gas, clay, and stone, furnish the foundation for manufacture and construction on the largest scale.

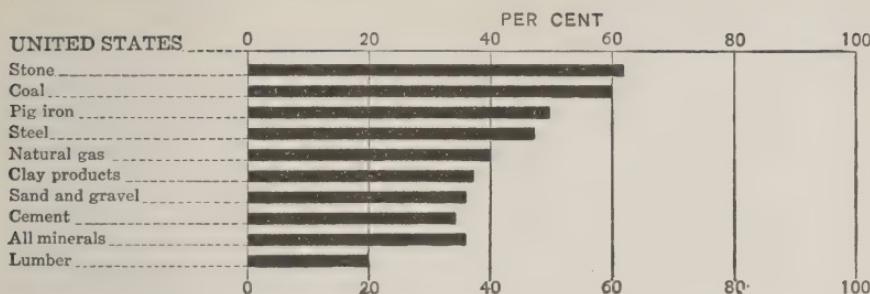


FIG. 101.—Rank of Eastern States in mineral and forest products. (See Table IV, Appendix.)

QUESTIONS

1. Will the coal fields of the Eastern States ever be exhausted? What can be done to conserve the supply?
2. If coal should become scarce and costly, what would be the effect upon business and population?
3. Would it be a good plan for the Federal Government to operate the mines and control the distribution of coal?
4. How were streets and houses lighted before coal gas and petroleum were discovered?
5. What mineral resources are inexhaustible?
6. What is being done in your state for the conservation of forests?
7. Look up the origin and meaning of the phrases "stump speaking," "log rolling," "taking to the tall timber." Why did they originate in the Appalachian region?

CHAPTER XVII

THE EASTERN STATES: MANUFACTURES

THE geographical conditions which make possible the supremacy of the Eastern States in manufactures have been given on pp. 182-183. Nearly all lines of industry are represented, and most of them on the largest scale. Table V in the Appendix and Fig. 122 show the very high rank held by this region in the production of basic materials, such as pig iron, cotton cloth, woolens, silk, leather, and paper and also of finished products, such as steel, glass, chemicals, cordage, clothing, carpets, hosiery, boots and shoes, gloves and mittens, and printed matter.

Power. — Of the power used in manufacture in the United States, about 6 per cent is derived from streams and the rest from fuel, chiefly coal. Of all the water power utilized 70 per cent is found in the Eastern States and 40 per cent in New England. Manufacturing began in New England before the invention of the steam engine and was successful because there were many small streams with good fall and narrow valleys which could be easily dammed. Among these the Merrimac, Blackstone, and Connecticut were the most important. The water power has long since been outgrown and now forms only 20 per cent of all the power used.

The power of water is due entirely to its weight and is proportional to the quantity multiplied by the "head," or vertical distance through which it falls. Natural cataracts are generally most available, but an artificial cataract can be made by building a dam. It is generally inconvenient to place the mill or wheel directly under the fall, therefore it is built at one side

and water is led to it by a race or canal. Fuel can be carried to the factory, but the factory must go to the water power. This difficulty has been largely overcome since invention has made it possible to conduct power hundreds of miles by the electric current and to distribute it in small quantities wherever needed. The largest water power now in use, and perhaps the largest in the world, is at Niagara Falls. There a river, with the upper Great Lakes above it for reservoirs, and a volume which never varies, falls 160 feet. There is power enough, if completely utilized, to supply four or five of the largest cities. At present only a small fraction of the river is diverted to



FIG. 102.—Water power on the Niagara gorge. Note the penstocks conveying water to a power house at the foot of the bluff.

power houses (Fig. 102) where electricity is generated and sent to Buffalo and other cities within 150 miles to be used for lighting and for running cars and machinery.

Iron and Steel.—Iron ores are abundant and widely distributed, but the utilization of any particular deposit depends upon the purity of the ore, the presence of fuel, and the access to markets. The first iron furnaces in America were scattered along the Appalachians from Vermont to Georgia. They were small and supplied only a local demand. The fuel used was charcoal and the blast was produced by water power. The use of anthracite in eastern Pennsylvania about 1840 stimulated and

concentrated the iron industry in that region (Fig. 103). The extension of railroads through the bituminous coal field and the use of coke, which is less expensive than anthracite, soon shifted the iron-making district to western Pennsylvania.

Pittsburgh, at the junction of three navigable rivers and with good ore and the best of steam and coking coal at hand, became

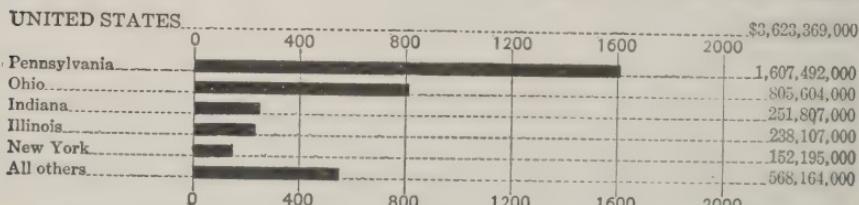


FIG. 103.—Manufacture of iron and steel, by states (1919), in millions of dollars.

the natural center of the industry. The exploitation of the rich ore deposits around Lake Superior (p. 137) since 1885 has served only to increase the importance of Pittsburgh, which has become the leading iron working center of the world. It is cheaper to ship the ore to the fuel than the fuel to the ore, and this movement on the largest scale is made possible by the waterway of the Great Lakes (p. 157). The Pittsburgh district has expanded until it comprises western Pennsylvania, eastern Ohio, and northern West Virginia, where scores of "iron towns" have sprung up and it is difficult at night to get out of sight of furnace fires.

The lake ports of the Appalachian and Eastern Interior coal fields (p. 194), Buffalo, Cleveland, Chicago, Milwaukee, and Gary, Ind., are vigorous rivals in the making of iron and steel from Lake Superior ores, but neither yet equals "the Smoky City" of coal, oil, and gas. In eastern Pennsylvania, ores imported from Cuba, Newfoundland, Sweden, and Spain are mixed with domestic ores and smelted to supply the seaboard market.

Smelting.—The smelting or extraction of iron from the ore requires a very high temperature, which can be obtained only in a blast furnace. The furnace, shaped like a bottle having its largest diameter a little above

the bottom, is built of masonry or steel and lined with fire brick. It may be 90 feet high and 15 feet across. After a fire is started, coke, ore, and limestone are dumped in alternately at the top. A blast of hot air is blown in near the bottom, and at a temperature of about 2500° some elements of the ore combine with the coke to form gases which escape at the top. Other ingredients unite with the limestone to form a liquid slag. In six or twelve hours the bottom of the furnace is filled with liquid iron, upon which the slag floats like cream on milk. The slag is drawn off through an upper opening and has usually been thrown away as waste. Recently it is being used as material for making cement (p. 142). The iron is drawn off through a lower opening and run into sand or iron molds, where it cools and solidifies into "pigs." (See Fig. 104.)

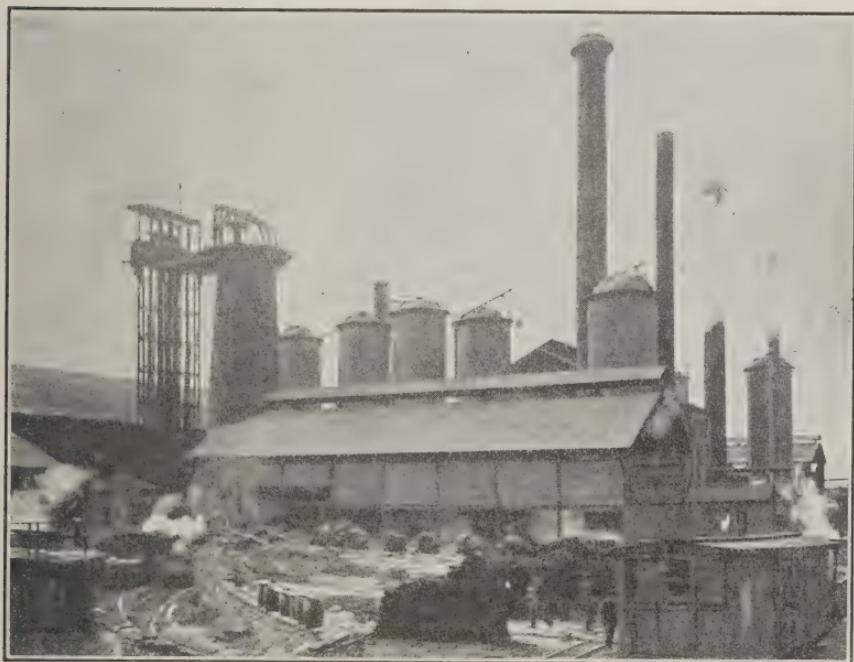


FIG. 104. — The high tower at the left is a blast furnace with a hoist for ore and coke beside it. The lower towers are ovens for heating the blast. "Pigs" of iron stacked in the foreground.

Pig Iron, Wrought Iron, and Steel. — *Pig or cast iron*, as it comes from the furnace, contains two per cent or more of carbon,

which makes it hard but rather brittle and unworkable under the hammer. When hot it is very liquid and can be poured into a mold of any shape, which it fills in all its corners, making when cold a good casting. It is used for the large and massive parts of machinery and for small, irregular pieces which do not require great strength, like the parts of a stove.

Wrought iron, the purest form of the metal, is soft, flexible, and tough and can be welded and hammered into any shape without breaking.

Steel is a variety of iron which combines the good qualities of cast iron and wrought iron with some of its own. It contains

less carbon than cast iron. It can be made hard or soft, brittle or tough, and can be hammered or cast. It is one of the strongest and most elastic of materials. By varying slightly the proportion of carbon, and by heating and cooling rapidly or slowly ("tempering"), we may give to steel the exact qualities desired for a watch spring, a razor, a railroad rail, a fence wire, an anchor chain, a bridge



FIG. 105.—A Bessemer converter in action.

beam, armor plate for a battleship, or sheets to be coated with tin and made into "tinware."

The use of steel on a large scale was made possible by the Bessemer process invented about 1856. By blowing a blast of air through molten pig iron

in an egg-shaped "converter" it is converted into steel in a few minutes and at a small cost. (See Fig. 105.)

While Bessemer steel is relatively inexpensive, it can be made only from certain kinds of ore, and it is not so good in quality as steel made by the

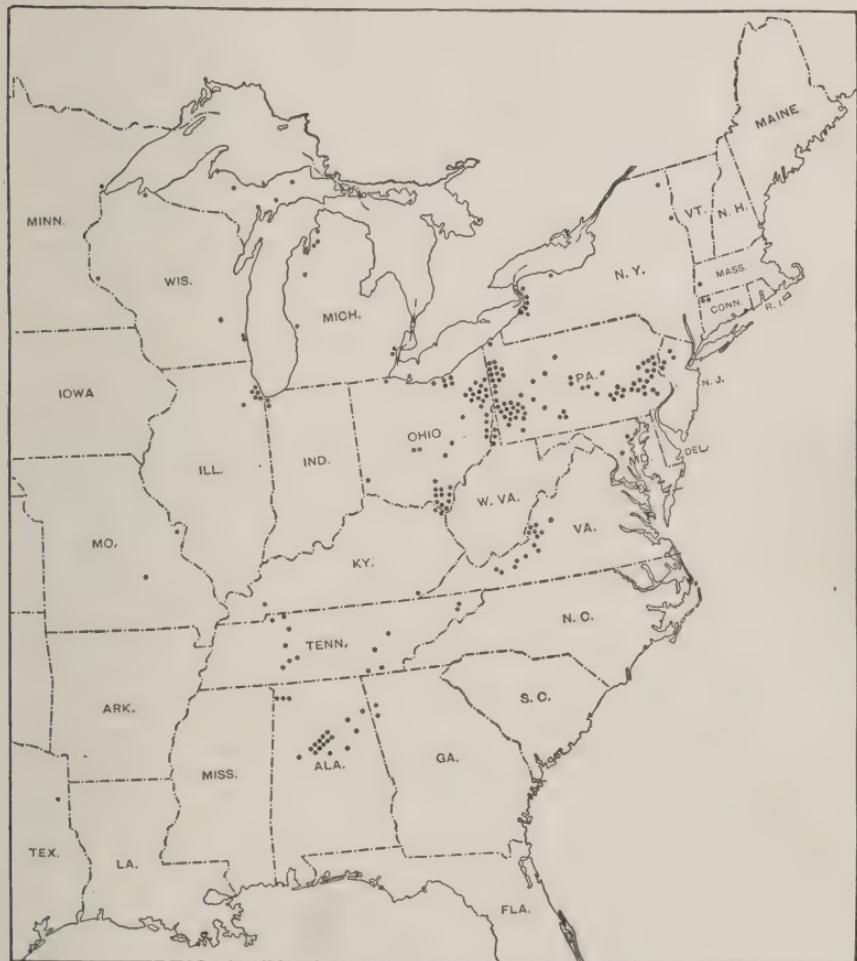


FIG. 106.—Location of blast furnaces, 1909.

open-hearth process now coming into general use. This consists in melting cast iron in a shallow furnace by causing flame to flow over its surface, and in adding iron ore and scrap steel until the material acquires the proper composition. This takes about twelve hours. The quantity of open-

hearth steel now made in the United States is four times that of Bessemer. On account of its great strength and durability, steel has largely displaced other varieties of iron, and this is often called "the age of steel."

Division of Iron Manufacture. — Articles made of iron and steel are so numerous and varied that the industry has become highly specialized and divided into many departments. The primary plant which furnishes material for all the rest is the blast furnace, of which there were in 1919 in the United States 191: in the Middle West 71, in the Eastern States 90, and in the Southern States 29 (Fig. 106). The largest furnaces turn out 600 to 900 tons of pig iron a day. Nearly one half of the whole furnace product is delivered while still hot and liquid to mills where it is converted into steel.

Most of the molten steel is run into ingots and allowed to cool until it is stiff enough to handle. In a rolling mill, the ingots, weighing many tons each, are passed, while still hot and soft, between rollers which squeeze them into thinner and longer masses until the metal has been rolled down into railroad rails, plates, sheets, or bars of various sizes called billets. Of steel works and rolling mills, there are in the United States 475, of which 287 are in the Eastern States, 170 in the Middle West, and 9 in the Southern States. Rods and wires are made by drawing the hot steel through holes of different sizes. Large articles of other shapes are forged under hammers of enormous weight.

Foundries. — The most widely distributed establishment for iron work is the foundry where articles in great variety are made by casting. This process consists in filling molds with melted iron or steel and allowing the metal to cool and solidify. The molds are generally made of a special kind of sand built up around a pattern of wood, which, when removed, leaves a space of the desired shape. Other works produce structural steel in large pieces for bridges, buildings, and ships. Others are devoted to making nails, bolts, screws, tools, cutlery, and the vast variety of small articles found in a hardware store. Still others manufacture pipe, stoves, car wheels, engines, or special kinds of machinery. To trace the iron which runs out of a blast furnace through all the changes and processes by which it is converted into the almost innumerable "finished products" in common use would require a volume. To discuss these processes and products would be to write the history of modern industrial civilization.

Table V in the Appendix shows that the Eastern States lead the other economic regions of the United States in the extent of their iron industries, and in many departments equal or exceed all the rest combined. If the extension of the Pittsburgh district into Ohio is included in the Eastern States, with which it naturally belongs, their superiority becomes very striking. Pennsylvania has more blast furnaces than any other state and also produces 45 per cent of the steel made. Among cities, Pittsburgh, Youngstown, O., and Chicago rank highest in value of steel produced. Of the world's supply of steel the United States makes about two thirds, Germany more than one tenth, and Great Britain more than one eighth.

Textiles. — As clothing is second in importance only to food, so among manufactures textiles, or woven goods, stand next in value after foodstuffs. The rudest peoples know how to braid or weave grass, bark, and leaves into coarse mats, blankets, and other fabrics which resemble basketwork or the plaiting of a straw hat. The use of fine fibers like wool, flax, and cotton is more difficult and requires considerable skill. Such fibers are only an inch or two long and must be spun by twisting them together to make a continuous thread. The arts of spinning and weaving were invented in prehistoric times and have been practiced for thousands of years, but until about 150 years ago the work was done by hand (Fig. 107).

Spinning and Weaving. — *Spinning* consists essentially in drawing out a wad or roll of fibers and twisting it at the same time. This can be done with the simplest implements, a distaff to hold the bunch of fiber and a spindle twirled in the hand. The spinning wheel run by foot or hand improved the product and increased the speed, but spun only a single thread. In 1770, James Hargreaves in England invented the spinning "jenny" (a machine named after his daughter), which contained twenty or more spindles. This machine, with many improvements and the number of spindles multiplied indefinitely, is the one still used in the large mills of the present day.

Weaving is the process of interlacing two sets of threads at right angles. A loom consists essentially of a frame upon which one set of threads, the

warp, is stretched, while the other set, the woof, is woven through them back and forth by means of a shuttle. The essential parts are simple and the quality and patterns of cloth may be considerably varied without complicated machinery. Hand looms are still in use in remote parts of Scotland, Ireland, and the United States. In 1787 another Englishman, Edmund Cartwright, invented a power loom which wove cloth much faster than the hand loom and was able to use the accumulations of yarn which Hargreaves' jenny had



FIG. 107. — Carding, spinning, and weaving cotton at home, Alabama.

spun. The new machines were at first run by water or horse power, but these were soon supplemented by Watt's newly invented steam engine. In 1793 Eli Whitney in the United States invented the cotton gin, which could remove the seed from 5000 pounds of cotton a day. Before this invention, one person could remove by hand the seeds from only one pound a day. This machine gave an enormous impetus to the growing and manufacture of cotton. These inventions secured to all mankind an abundant supply of clothing forever.

Early Textile Industry in America. — Spinning and weaving were carried on by the early settlers of New England, who brought wheels and looms with them. The severity of the climate made good clothing necessary, and distance from the

Old World made it difficult and expensive to buy. They were, therefore, compelled to provide for themselves. Textiles made by hand were at first a by-product of agriculture, manufactured in the farm homestead. The farmers planted flax and raised sheep. Some wool was imported from Spain and cotton from the West Indies. A stout cloth, called fustian, was made from linen and cotton, and kerseys and linsey-woolseys suitable for winter wear from linen and wool. Learning to spin and weave was an important part of the education of every woman. At one time in Boston, spinning schools and bees became a fashionable craze, and men took pride in wearing homespun.

Between 1788 and 1794 mills containing machines run by water power were established at Philadelphia, Beverly, Mass., Pawtucket and Providence, R.I., Hartford, Conn., and Paterson, N.J. The mill at Pawtucket used cotton from Guiana and Haiti costing a dollar a pound. The mill at Hartford made the fine, dark brown broadcloth for the suit worn by Washington at his inauguration in 1789. Between 1810 and 1827 textile manufactures were established at Manchester, N.H., Fall River and Waltham, Mass., Woonsocket, R.I., Amsterdam, N.Y., and Lowell, Mass., and in 1846-1847 at New Bedford and Lawrence, Mass. It is notable (1) that these mills were located on streams which furnish water power, and near good harbors; (2) that in nearly all of them the industry has continued to flourish and they are now the great textile centers of the United States (Fig. 108).

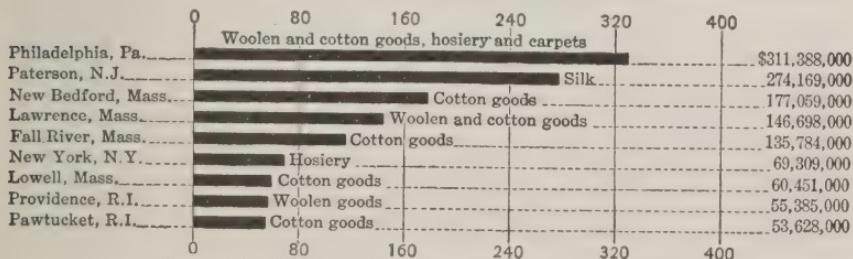


FIG. 108.—Rank of cities in manufacture of textiles, 1919.

Fibers.—Of fibers in general use flax, hemp, and wool date from the earliest times, while cotton and silk are quite recent.

Flax and Hemp.—*Flax* is grown both for the fiber of its stems and for the seed, from which linseed oil, indispensable in making

good paint, and oil cake for fattening cattle, are obtained. Before the advent of cheap cotton, flax was grown on nearly every farm in the United States and clothing was made from it in the household. The straw was "retted" by soaking in water, "broken" by pounding with a club, and "scutched" by drawing through a "hetchel" or comb with long wire teeth. The "tow" thus obtained was spun on a wheel, turned by a pedal, and woven on a hand loom. The whole process was laborious and the product was coarse linen cloth. Flax is adapted to a wide range of climate and is now an important crop in central and northern Europe from Ireland to Siberia. It is difficult to prepare and to spin, but the finest thread and cloth used for handkerchiefs, towels, collars, cuffs, and table linen are produced in northern Ireland, southern Scotland, Belgium, Germany, and Bohemia. A machine which would do for flax what the gin did for cotton might so cheapen linen as to make it a rival of cotton for clothing.

Hemp resembles flax but the fiber is coarse and used chiefly for making rope, twine, sacking, and matting. It is now of less importance than jute from India, Manila hemp from the Philippine Islands, and sisal from Yucatan.

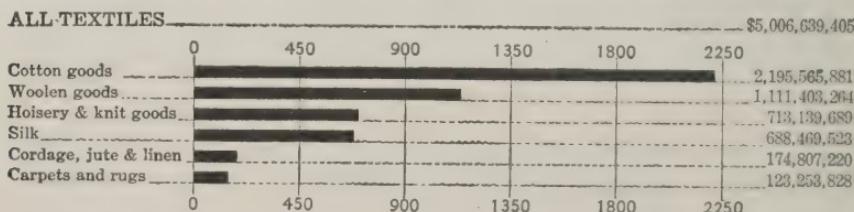


FIG. 109.—Textiles manufactured in United States, 1919. (See Table V, Appendix.)

Wool.—The fibers of wool differ from all others in being crinkly and scaly; therefore, woolen cloth is thicker, heavier, warmer, more elastic, and less easily wet than fabrics made from vegetable fiber. It is open to the serious objections that it is irritating to the skin and can hardly be washed without injury. Therefore, it is used chiefly for outer garments, especially those worn by men. Wool is also made into felt, which is a matted, tangled mass without threads.

Woolen goods are usually "fulled" by beating and teasing until the threads are hidden by a soft, furry, feltlike surface. Cloths which are not fulled and show the thread plainly are called *worsteds*. *Shoddy* is a thick, warm, cheap, but weak cloth made from woolen rags. Wool is produced by sheep which are raised also for mutton and are widely distributed in all the temperate regions of the world which are not too wet. The quality of the wool varies with the climate and the breed of sheep. It is bulky but light and the price paid to the producer is so high that it can be transported long distances without greatly increasing the cost to the manufacturer. He can afford to import from any part of the world the kinds needed to supply his market. Consequently wool is an article of extensive and long-distance trade. In the United States nearly half the wool is raised in the Pacific Division and three fourths of the 492 million pounds used is imported. Wool for the finest goods is obtained from Australia, New Zealand, and Argentina, while a heavy importation of coarse carpet wools comes from China, Russia, Turkey, and Scotland.

Woolen manufacture is one of the most concentrated of industries. More than nine tenths of it belongs to the Eastern States, two fifths each to Massachusetts and Pennsylvania and one seventh to Rhode Island. The leading cities are Lawrence, Philadelphia, and Providence. The average value of the goods made from a pound of wool in 1909 was about one dollar. (See Fig. 110.)

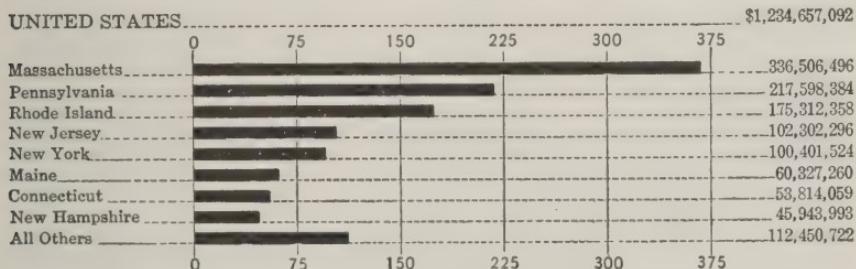


FIG. 110.—Manufacture of woolen goods, by states (1919), in millions of dollars.

The value of woolen goods manufactured in Great Britain, Germany, and France is in each country about the same as that manufactured in the United States. Each of these countries imports twice as much wool as does the United States, most of it from Australasia and Argentina, which grow more than half the wool of the world, export nearly all they grow, and buy back manufactured goods. On account of the large area required to

support sheep, the world's supply of wool does not keep up with the demand, and mixed goods of wool and cotton are coming more and more into use.

Cotton. — The cotton plant was widely distributed throughout the warm temperate and tropical regions of the world and its seed fiber was in general use for clothing before the dawn of history. Yet the commercial manufacture of cotton on a large scale dates from the invention of the cotton gin in 1793. Previous to that time cotton cloth was more expensive than linen or woolen. Machinery for spinning and weaving was ready, but the supply of raw material was limited by the cost of labor in seeding by hand. With this obstacle removed, the production and manufacture of cotton increased by leaps and bounds, until it now forms nine tenths of all the materials used for clothing. The Southern States produce about three fifths of the world's cotton crop, India one fifth, and China, Egypt, Russian Turkestan, and Brazil nearly all the rest.



FIG. III.—Cotton mills, Rhode Island.

Cotton manufacture in the United States was at first almost confined to New England, which still holds its supremacy, not in amount of raw cotton consumed, but in value of the product. The location of mills was determined by the presence of water

power, as that of the Merrimac River in New Hampshire and Massachusetts, and of the Blackstone in Rhode Island (Fig. 111). Many of the mills have outgrown the water power and use steam. Coal is obtained by cheap ocean transportation. The leading city in the cotton industry is New Bedford, but its neighbor, Fall River, is a close second. Lowell, Philadelphia, and Pawtucket stand next in rank.

The mills of the Southern States use more cotton than those of the Eastern States, but their product consists of coarser cloths which are mostly exported. While the United States is the only important country that produces raw cotton enough for its own use, the fiber of finest quality is imported from Egypt and Peru. In total value of goods the United States stands second only to Great Britain. (See Fig. 112.)

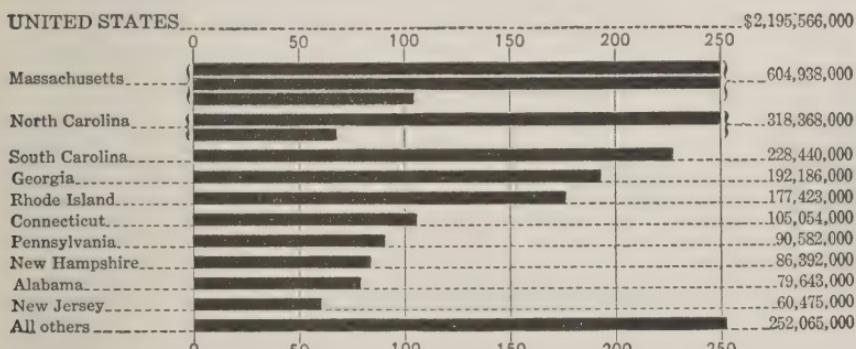


FIG. 112. — Manufacture of cotton, by states (1919), in millions of dollars.

British Cotton Industry. — The possession of a large body of skilled workmen, trained through many generations to spin and weave, and the invention among them of the spinning jenny, power loom, and steam engine gave the English a long start ahead in cotton manufacture. A favorable climate, abundant coal, the first-class harbor at Liverpool through which food and raw materials are imported, peace at home, plenty of capital, skilled labor, and merchant ships which reach all ports have made the region within forty miles of Manchester the center from which 70 per cent of the world's export of cotton cloth is sent out.

English cotton goods may be bought in every considerable dry goods store in America, and it would be difficult to find a corner of the world, outside the polar regions, where they are unknown.

The cotton industry flourishes in Germany, France, Belgium, Holland, and Switzerland. It is carried on in northern Italy, Spain, Bohemia, and Poland and has penetrated even India, Japan, and China. Cotton is the king of fibers and by far the most valuable plant known to man outside the cereal grains. It literally clothes the world in the sense that few human beings, savage or civilized, do without it.

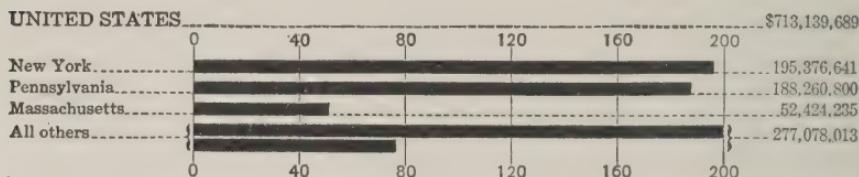


FIG. 113.—Manufacture of hosiery and knit goods, by states (1919), in millions of dollars.

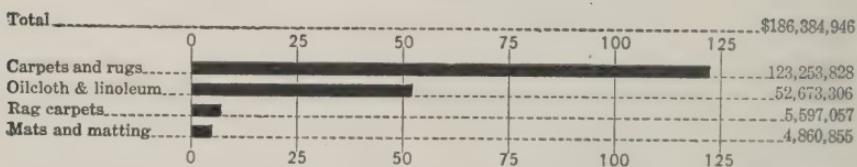


FIG. 114.—Manufacture of floor coverings (1919), in millions of dollars.

Silk.—Silks, first brought to Europe from China before the Christian era, have continued to be a luxury valued for their luster and beauty. Raw silk is an exceedingly fine thread which a caterpillar, called the silkworm, draws from its head and winds around itself in preparation for changing into a moth (Fig. 21). When the cocoon thus made is completed, the worm is killed by heating and the thread is unwound, from five to twenty threads being combined into a single fiber. Silk culture consists in gathering the eggs of the moth and feeding the worms, when hatched, on fresh mulberry leaves until they are mature and ready to spin their cocoons. The mulberry tree thrives in the tropical and warm temperate zones, but the worms are delicate and require care in securing proper temperature, humidity, and cleanliness.

Therefore, raw silk is produced only where skilled labor, mostly that of women and children, is abundant and cheap. Japan is especially well provided in this respect and now produces three fifths of the world's supply. China yields one fifth, and southern France and northern Italy, combined, one eighth.

Silk Manufacture. — The French have taught the world how to attain the highest degree of excellence in silk fabrics, the center of the industry being at Lyons in the Rhone valley. French satins, velvets, brocades, and ribbons have become famous as the most beautiful, durable, and costly of dress goods. The demand for them is necessarily limited, but the market for lighter, poorer, and cheaper goods is capable of indefinite expansion. Swiss and German manufacturers cater to this growing trade and their French neighbors are obliged to compete.

In the silk industry the cost of transportation is trifling compared with the value of the goods. Hence it is possible for the United States, although producing no silk, to manufacture more than any other country. Raw silk worth \$3.00 a pound is imported to the value of \$392,000,000 a year, about two thirds of it from Japan. Silk manufacture, one of the youngest of Ameri-

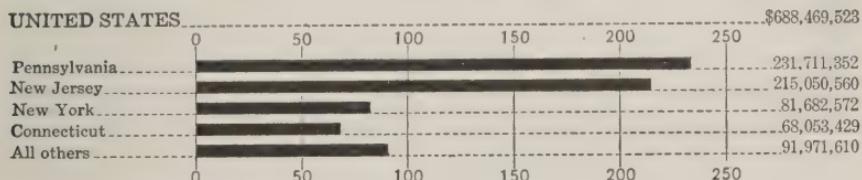


FIG. 115.—Manufacture of silk, by states (1919), in millions of dollars.

can industries, is one of the most vigorous. Cheapening of the goods has placed them within reach of millions of people, and the output has doubled in five years. Silks are no longer luxuries for the rich, but the common finery of the masses. The industry is concentrated in a district extending from Connecticut to eastern Pennsylvania, with Paterson, N. J., as a leading city (Fig. 115). The labor is performed chiefly by women, and in this district the wives and daughters of men employed in iron and cement works and coal mines are available.

Artificial Silk. — The silkworm makes raw silk out of mulberry leaves. It is possible to produce similar chemical changes in the laboratory by which cotton is converted into artificial silk. This substance can be spun and woven, possesses even a higher luster, and is much cheaper than natural silk, which it may in time displace.

Clothing. — Textiles are made into clothing of many sorts. No other industry covers so wide a range of form, size, quality, style, and cost. Making clothes was once wholly a domestic industry. Cutting out garments and doing the family sewing took much of the time of the women in every household. Later, the tailor became as important a member of the community as the shoemaker, and like him was often a "journeyman," going from house to house. When the tailor came to have a shop of his own, the seamstress set up as a dressmaker, and the household was largely relieved.

The invention of the sewing machine about 1850 made possible the beginning of the ready-made clothing business. It is carried on by two systems, the "sweatshop" and the factory. By the former, garments in pieces already cut out were sent to the homes to be sewed. The pay often was so small that many workers — men, women, and children — worked long hours in crowded, unsanitary rooms to earn the bare necessities of life. Sweatshop conditions have now been generally improved and the system to some extent broken up. There has been of late a rapid increase of clothing manufacture in factories equipped with power machinery for cutting and sewing, and the cost in money and human life has been notably reduced.

The making of clothes has been the last of the domestic arts to pass into the factory stage, and the change is incomplete. Some clothing, principally that of women and children, is still made at home. The more costly garments for men and gowns for women are "custom-made" by the tailor and "modiste." The sizes, patterns, and styles of ready-made and "ready to wear" clothing are so numerous that at an outfitting establishment any man, woman, or child can be completely and decently clothed in a few minutes.

A sufficient labor supply and a market for all the sizes and styles restrict the location of the clothing manufacture to large cities. One half of the two billion dollars' worth is made in the city of New York and three fourths in the Eastern States. Illinois is the second state and Chicago the second city, while Philadelphia is second for women's clothing. (See Fig. 116.)

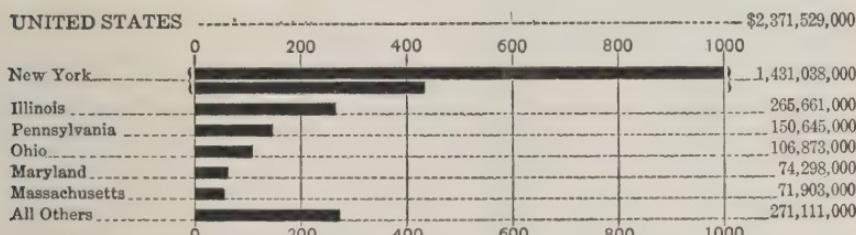


FIG. 116.—Manufacture of clothing, by states (1919), in millions of dollars.

The Leather Industry.—The brunt of man's struggle with nature for a living is met by his hands and feet and he has found it advantageous to protect them with an artificial skin. For this purpose, furs, skins, and leather furnish tough and flexible material. Animal skins, with or without hair, scraped and cured with oil, are widely used among primitive people. Leather is a product of the arts of civilization and, before the days of cheap textiles, was made into clothing more serviceable than sanitary. Outside the tropics few people go entirely without foot-wear, and "to handle without gloves" has come to mean close and vigorous action.

Hides and Tanning.—Hides used for leather are taken from a great variety of animals, cattle, sheep, goats, dogs, pigs, horses, and even alligators, kangaroos, monkeys, walruses, and whales; but the skins of domestic animals are by far the most important.

After a thorough preparation by soaking, cleaning, and removing the hair or wool, hides are tanned or converted into leather by two processes. The oldest, and until recently the only, method accomplished this by the use of tannin obtained from various barks, woods, and leaves. The principal sources are oak and hemlock bark, but birch, spruce, chestnut, quebracho

from Argentina, sumac from Sicily, and various other materials are used. The bark or wood is ground and leached with hot water to obtain a strong solution of tannin. The hides are soaked in vats of this tan liquor for a year or more. Within the last twenty years, vegetable tan liquor has been largely displaced in the United States by solutions of various chemicals,

chiefly potassium bichromate. By the chemical process hides are converted into leather in a few days. The hides of steers, cows, and calves make heavy leather used for soles and coarse shoes. The skins of wild goats furnish material for light shoes and for gloves.

The United States is the richest country in the world in tanning materials and leads in the manufacture of leather. The forests located the tanneries which were once almost as numerous as grist-mills from Maine to Georgia, and later westward to Wisconsin. Better facilities for transporting the



FIG. 117.—The village shoemaker.

bulky bark, the importation of hides at the great seaports, and the rise of the factory system have concentrated the tanning industry in a few states, mostly in the Eastern States. The chemical process has made Philadelphia the greatest leather center in the world, and Pennsylvania the leading state; Massachusetts stands second, New York not far behind. Hides are

obtained from all parts of the country, and nearly \$119,000,000 worth are imported, more than one third from Argentina. About 50 million goatskins are brought from India, China, Mexico, and other arid countries.

Boots and Shoes. — Long after textiles and clothing had become factory products, footwear continued to be made by hand, either in the household or in one-man shops (Fig. 117). The man who could sit on a bench and with a few tools make a pair of boots, cutting out the pieces from a "side" of leather, sewing or pegging them together with wooden pegs, and fitting each pair to the measure of the individual customer, was an artisan of no mean skill. The village shoemaker's shop was a social as well as an economic center, from which gossip and sometimes wisdom and culture were disseminated in the community.



FIG. 118.—A shoe factory in Massachusetts.

Handmade footwear has now been almost entirely superseded by shoes made in factories which turn out 5000 to 10,000 pairs a day (Fig. 118). It is one of the most complex and highly

organized of industries. Scores of pieces of leather of different shapes, sizes, and qualities are cut out and put together to make one shoe, which is finished by scouring, staining, cleaning, ironing, and polishing. In all about fifty operations are required, each performed by a different machine and operator. The work is completely revolutionized. Formerly a single artisan made a whole shoe by hand. Now each workman makes only some small part of a shoe with a machine, little skill being required. While the excellence of the work and the ability required of the workman have necessarily deteriorated, a great variety in quality, style, and size is turned out at less cost and people are better shod than before.

The boot and shoe industry, like that of leather, is strongly concentrated in the Eastern States, which turn out about three fourths of the 275 million pairs made. Massachusetts alone produces more than one third, chiefly at Lynn, Brockton, and other towns near Boston. Recently there has been a tendency of the industry to spread westward, and St. Louis has become the

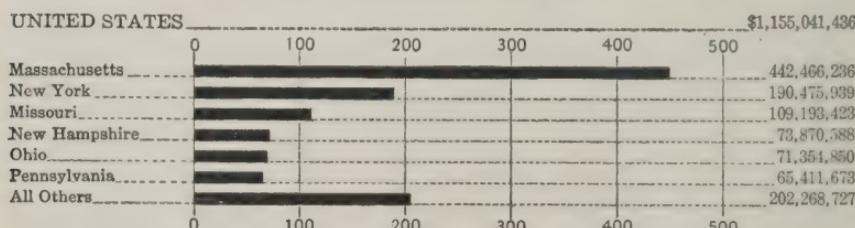


FIG. 119.—Manufacture of boots and shoes, by states (1919), in millions of dollars.

third city and Missouri the third state, although producing less than one tenth of the total (Fig. 119).

American methods of tanning, and the machinery for making shoes, have extended to Europe, with results similar to those in the United States.

Gloves.—Compared with shoes, gloves are articles of luxury worn by the few and subject to changes of taste and style. Their manufacture is in some degree an artistic industry, and much more simple than that of shoes. Goatskins are specially prepared by scouring, stretching, dyeing, and softening with yolks of eggs. The pieces are cut with dies or stamps and sewed on

specially constructed machines. About one half the gloves made in the United States come from two small towns, Gloversville and Johnstown in central New York, where Scotch glove makers settled and established the business a century ago.

In France, Germany, Holland, and Belgium, leather is tanned with bark from the basket willow and converted into a large output of fine kid gloves. The greatest center is around Grenoble in the lower Rhone valley. This is due to the supply of goatskins produced in the mountainous and arid Mediterranean countries, to water power from the Alps distributed by electricity to many small factories, and to the artistic ability of the people.

Rubber. — A notable feature of modern scientific economy is the extensive and increasing use of rubber. The method of collecting crude rubber has been given on page 32. The enormous demand for it has led to the planting of rubber trees in Ceylon and the Malay Peninsula and Islands. "Wild" or native rubber is obtained from many species of trees and vines, one of which is grown in the United States as an ornamental house plant. They are widely distributed over tropical America, Africa, and the East Indies. The crude gum was called rubber because it was first used as an eraser. The Goodyear process (1842) of making it hard and durable by mixing it with sulphur was an invention of greater importance than the chemical tanning of leather. This process made it possible to manufacture rubber boots and shoes, waterproof clothing, pneumatic tires for bicycles and automobiles, hose, tubing, combs, buttons, and many other "hard rubber" articles.

The people of the United States consume about six pounds of crude rubber apiece every year, and manufacture it into goods worth \$1,289,000,000, nearly half in the state of Ohio and more than one third at Akron.

Paper and Printing. — In the economy of advanced peoples paper is almost as important as textiles (Fig. 120). The quantity of paper used might be taken as a better index of the stage of civilization than soap or iron. Paper is almost the only

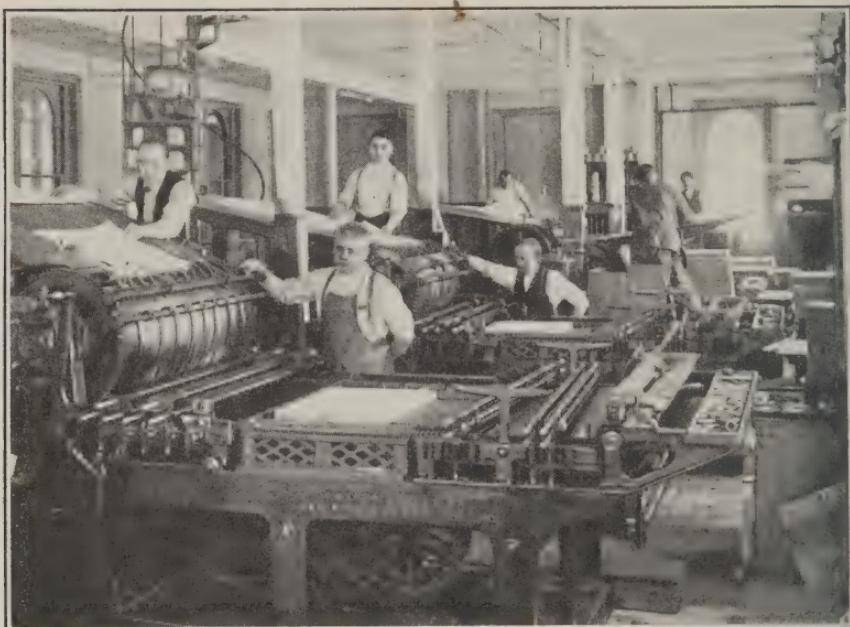


FIG. 120. — Printing weather maps. The white stone, having the map engraved on it, slides under the small rollers which carry ink, then under the large cylinder which, as it turns, presses a sheet of paper upon the stone.

material by which literature is distributed, and is, therefore, closely related to the intellectual life of the people. Paper consists of matted vegetable fiber and can be made from a great variety of materials. Cotton and linen rags, grass, straw, and wood are commonly used. They are ground to a fine pulp, mixed with water, and spread out in sheets to dry. The entire process is now performed on a large scale by machines, some of which turn out 50 tons a day.

Since wood pulp became the chief material for paper making, mills have been built in the northern forests. The highlands of New York and New England and the wilderness of Ontario, Quebec, and Newfoundland furnish raw material and water power to the largest plants. Spruce wood is most sought for, but hemlock, pine, fir, poplar, cottonwood, and other species are used. The solid logs ground upon a grindstone yield a pulp which, when

screened, pressed, and dried makes common "newspaper." A much better grade suitable for books is made by digesting wood chips in hot alkali. Holyoke, Mass. is the chief center for rag and fine writing papers. In the wheat belt of Ohio, Indiana, and Illinois coarse wrapping paper and straw board are made from wheat straw. New York, Maine, and Massachusetts are the leading states in the paper industry, and their chief western rival is Wisconsin. A single metropolitan newspaper may use every day 25 tons of paper made from 35 tons of wood and issue a square mile of print. To supply one paper mill requires the destruction of thousands of acres of forest. Cheap paper is as necessary to civilization as any other commodity, and to find material for it is one of the problems of the near future.

Printing and publishing is one of the most widely diffused of industries. There are few counties or towns in the country, in which there is no printing press. Yet more than half the literary

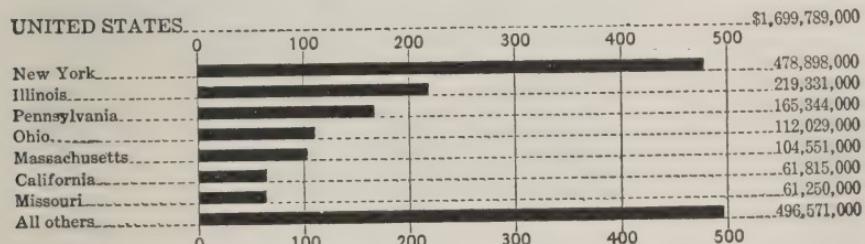


FIG. 121.—Printing and publishing, by states (1919), in millions of dollars.

product of all kinds comes from the Eastern States and nearly one fourth from New York (Fig. 121). Among cities New York, Chicago, and Philadelphia are most important.

Shipbuilding.—During the World War shipbuilding reached its highest degree of efficiency, and in 1919 the United States, for the second time, took first rank among the nations of the world. The tonnage of new ships launched was over four million tons, or 57 per cent of the world's total production. Great Britain, Japan, and Canada ranked next. Shipyards on the Atlantic and Gulf coast produced one half the tonnage, those on the Pacific coast one third, and those on the Great Lakes one eighth. The rest were built on the western rivers. The whole number of new ships was 2,338, of which about three fifths were

of wood and the remainder of steel, except a few of reënforced concrete. Only about five in a hundred were sailing vessels.

Specialties. — There are many other lines of manufacture which belong especially to the Eastern States, but which are of minor importance compared with those already discussed. The location of most of them was originally determined by some natural advantage of water power, raw materials, or transportation. Some owe their existence to individual enterprise and capital, or to the presence of skilled labor. An industry once established is likely to continue after the special conditions which led to its foundation have ceased to exist. (See Fig. 122.)

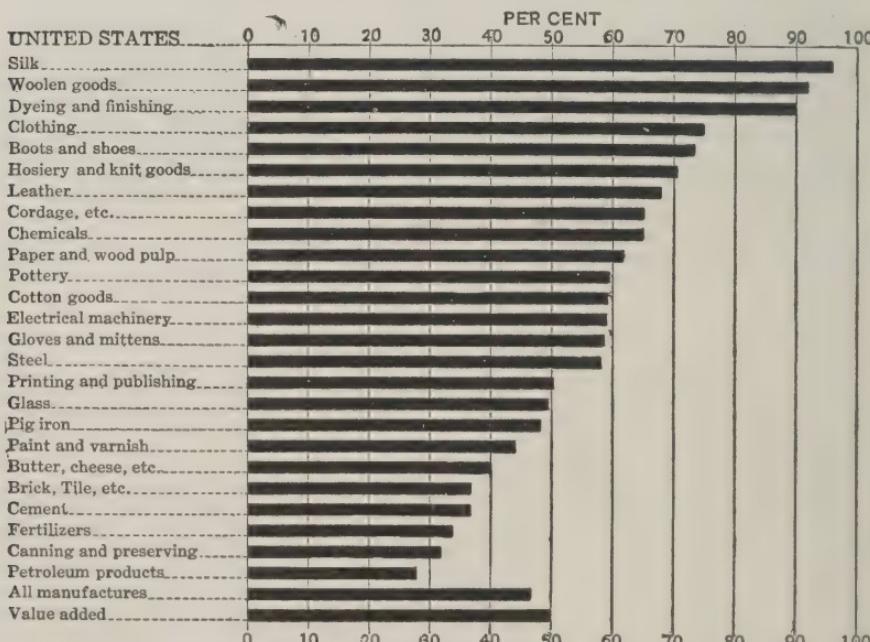


FIG. 122.—Rank of Eastern States in manufactures. (See Table V, Appendix.)

To this minor class belong in New York state flour milling at Rochester, the manufacture of cornstarch at Oswego, of salt and chemicals at Syracuse, of shirts, collars, and cuffs at Troy, and of aluminum and shredded wheat at Niagara Falls. In Connecticut hats are made at Danbury, bicycles at

Hartford, firearms at New Haven, clocks at Waterbury, hardware at New Britain, brass and bronze at Ansonia and Bridgeport, and plated ware at Meriden. Providence, R.I. is noted for jewelry, Waltham, Mass. for watches, and Trenton, N.J. for pottery.

After the outbreak of war in Europe in 1914, a new industry sprang up in the Eastern States. Hundreds of factories were enlarged, refitted, or newly built for the production of arms, shells, explosives, and other munitions of war, for exportation to Europe. This grew to be one of the leading industries of the country, with products of hundreds of millions of dollars in value annually. This business flourishes only in war time.

The Eastern States produce one half the total value of goods manufactured in the United States. The value per capita is \$834,

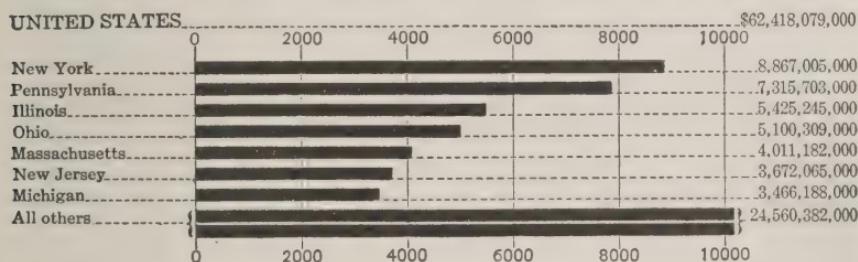


FIG. 123.—Rank of states in total value of all manufactures (1919), in millions of dollars.

and is highest in Rhode Island (\$1237), New Jersey (\$1163), Massachusetts (\$1041), and Connecticut (\$1000). (See Fig. 123.)

Summary.—On account of having water power, coal, and access to the sea, the Eastern States have become one of the great manufacturing regions of the world. They excel especially in textiles, boots and shoes, clothing, iron and steel, paper and printing, and shipbuilding.

QUESTIONS

1. Niagara Falls is one of the great scenic features of America visited by about 1,000,000 people every year. To divert water for power purposes will impair or destroy its beauty. Which is of greater value to the people, the power or the scenery?

2. If iron ore could be smelted at a low temperature, what difference might it have made in the history of mankind?
3. How does a blacksmith fit a horseshoe? weld a bar? What are horse-shoe nails made of? Why?
4. Of what are knives, axes, springs, and hammers made? Why?
5. What are the good qualities of cotton for cordage and cloth? How is cotton superior to linen? to wool? to silk?
6. Why is not raw silk produced in the United States?
7. For what is leather used besides footwear?
8. How might a scarcity of paper be beneficial to the community?
9. Compare the modern iron and steel worker with the smith who hammered out implements and weapons by hand; the operative in a textile mill with the spinner and weaver who worked at home; the man who works in a shoe factory with the shoemaker of fifty years ago. Which industrial system, the domestic or the factory, tends to make more intelligent and valuable citizens?
10. Has the great development of mechanical invention been, on the whole, beneficial to mankind? Why?

CHAPTER XVIII

THE EASTERN STATES: COMMERCE AND TRANSPORTATION

Waterways. — Natural and artificial waterways have played a large part in the economic development of the Eastern States. The greatest waterway is the sea and its arms, which furnished entrance and foothold for the colonists. The coastwise traffic is carried on by hundreds of steamers and sailing vessels, and on the bays and rivers by thousands of small craft. Chesapeake Bay and its branches furnish about 500 miles of waterway, Delaware Bay 120 miles, the Hudson 150 miles, and the Connecticut, Narragansett Bay, the Kennebeck, and the Penobscot 50 miles each. The drowned valleys, bays, sounds, and lagoons of the Atlantic coast (Fig. 88), extending with some interruptions from Massachusetts to Florida, provide a natural, protected "inland waterway" for small boats. The recently opened ship canal across Cape Cod completes the "inside passage," between New York and Boston through Long Island Sound, Buzzards Bay, and Cape Cod Bay. The part of the inland waterway south of New York is now little used, but its improvement and utilization are one of the probabilities of the future.

Erie Canal. — The Appalachian Highlands were a formidable barrier to the progress of settlement and economic expansion until the opening of the Erie Canal in 1825 connected the Great Lakes with the coast at New York. This was made possible by the drowned valley of the Hudson and by the valley of the Mohawk (Fig. 124). This river and its much larger glacial predecessor have cut a gap through the highland, which leads by easy grades to the shores of lakes Ontario and Erie. The canal

was the most important artificial waterway and internal improvement ever constructed in the United States. By it the state and city of New York gained control of the trade of the Great Lakes

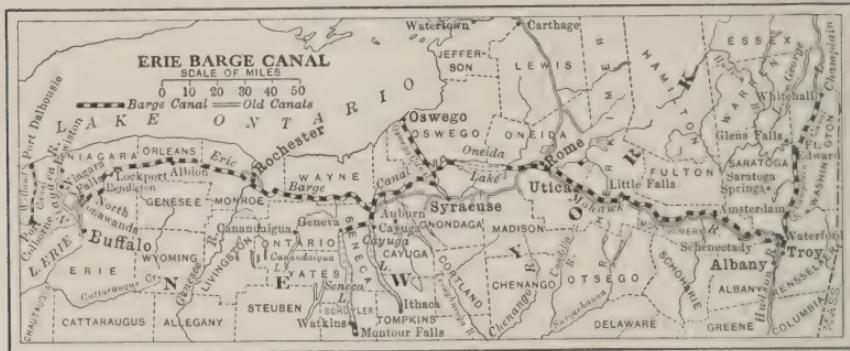


FIG. 124.—Erie Barge Canal.

and the Middle West. It remained the most important route of transportation for about forty years, but was later reduced by railroad competition to a position of insignificance. It has now



FIG. 125.—Erie Barge Canal. Rock cut at Waterford. Note material from cut piled on the banks.
(Buffalo Live Wire.)

been reconstructed as a barge canal twelve feet deep and is expected to regain its former importance. (See Figs. 125, 126.)



FIG. 126.—Lock on the Erie Barge Canal.

Boats on the old canal carried 250 tons and were towed by mules. On the enlarged canal the boats have a capacity of 1000 tons and are propelled by steam or electricity. A ship canal at least twenty feet deep which would permit the largest lake vessels to pass from Buffalo to the Hudson and thence to New York, may in the future constitute the principal outlet for the commerce of the Great Lakes. The Mohawk gap, traversed by such a canal and by the six tracks of the New York Central Railroad system, would become the most important gateway of the continent. The success of the Erie Canal led to the construction of many others, some of which were intended to connect Atlantic seaports with the Ohio through the water gaps of the Northern Appalachians. They were shallow, and small boats towed by animals could not compete with the railroads which took advantage of the same natural routes. Most of them have been abandoned, and those still open play an inconsiderable part in transportation.

Railroads. — The main trunk lines of railway follow the routes which the rivers have already graded for them across the highlands (Fig. 127). Of these the route of the New York Central

system through the Hudson-Mohawk valley is by far the most favorable. The first railroad in the United States, now the Baltimore and Ohio, has been extended from Chesapeake Bay up the Potomac valley to the Ohio, Mississippi, and Lake Michigan.



FIG. 127.—A railroad following a stream valley through the forested plateau of West Virginia.

The Chesapeake and Ohio takes its name from the waters which it connects through the valleys of the James and Kanawha. The Pennsylvania system passes from Delaware Bay through the Appalachian walls by way of the Susquehanna-Juniata valley. The valleys of the Delaware and its branches, with those of the upper Susquehanna, furnish similar but more difficult routes, between the sea and the lakes for the Erie, Lehigh Valley, and

Lackawanna railroads. These are the main trunk lines upon which the traffic of the Middle Western network and the strands of lake navigation are concentrated. There are no important north-south lines except those connecting the seaports and the Hudson-Champlain route between New York and Montreal.

Boston, the railroad center of New England, is connected with the New York Central system by the Boston and Albany and the Hoosac Tunnel line across the highlands to the Hudson; with New York directly by the New York, New Haven, and Hartford Railroad; and with Montreal, Portland, and Augusta by the Boston and Maine. The Grand Trunk Railroad of Canada has a terminus, most important in winter when the St. Lawrence is frozen, at Portland; and the Canadian Pacific crosses central Maine on its way to St. John and Halifax. The heaviest freight traffic is over the New York Central between New York and Buffalo and over the Pennsylvania between New York and Pittsburgh. The greatest number of passengers are carried between New York and Philadelphia, where hundreds of trains a day are run. The volume of traffic is concentrated upon a few great routes, where serious natural difficulties have been overcome by the exercise of engineering skill. Their capacity has been increased by multiplying the number of parallel tracks, ballasting the roadbed with stone, cutting off sharp curves, diminishing the steepness of the grades, building stone and concrete bridges, boring tunnels, laying heavy rails, and using steel cars drawn by the most powerful engines. The enormous movement of goods and people over a rough country has compelled the railroad companies to adopt a construction, equipment, and management scarcely equaled elsewhere in the world.

While the Eastern States have but 16 per cent of the railroad mileage of the United States, multiple tracks make it equivalent to several times that proportion. The railway density, or number of miles of road to 100 square miles of area is 17, but it is not so uniformly distributed as in the Middle West. New Jersey leads all the states with over 30 miles, while Massachusetts and Pennsylvania surpass Ohio, Illinois, and Indiana.

Foreign Commerce. — If the Eastern States were an independent political unit, their foreign commerce would exceed their

domestic. As a part of the United States their seaports serve as gateways, not only for their own commerce but for most of that of the Middle West. Their exports and imports amount to 65 per cent of the foreign commerce of the whole country (Fig. 36).

Summary. — The natural waterways of the sea and the Great Lakes, connected by the Erie Canal, give the Eastern States the best facilities for commerce. Difficulties of relief have been overcome by engineering skill, and traffic with the Middle West is concentrated upon a few railroad systems which pass through the water gaps in the highlands.

QUESTIONS

1. In 1902 the state of New York voted to use \$101,000,000 for the enlargement of the Erie Canal. Most of the popular vote in favor was cast in the cities of New York and Buffalo. Why?
2. How will the improvements recently made in the Erie Canal affect the cost of transportation?
3. What would be the advantages of a ship canal 20 feet deep from Lake Erie to the Hudson River? What use could be made upon it of hydroelectric power from Niagara Falls?
4. Should the cost of such a canal be borne by the state of New York or by the Federal Government? Why?
5. Why is two thirds of the foreign commerce of the United States carried on from the eastern side, and only one third from the other sides?

CHAPTER XIX

THE EASTERN STATES: AGRICULTURE AND FISHERIES

COMPARED with the Middle West, the Eastern States are poor in agricultural resources, yet previous to the opening of the Middle West the region supported 7,000,000 people. On the lowlands and in the valleys the soil is generally productive, but on the uplands and mountains it is fit only for pasture and forest. The largest continuous areas of agricultural land are on the Coastal Plain of New Jersey, Delaware, Maryland, and Virginia, and on the lake plain of New York. The most valuable crop is hay, amounting to 23 per cent of the total for the United States. In this New York leads all other states. Maine, New York, and Pennsylvania produce large crops of potatoes, raising the production of the Eastern States to 31 per cent of the total (Fig. 131). Western New York, once "the granary of the continent," has yielded that title to the Red River valley, and wheat has been superseded by potatoes, beans, vegetables, and fruit. In yield of oats New York and Pennsylvania hold a respectable place. It is remarkable that some of the New England states hold a higher record for yield per acre of the common crops than any in the Middle West. This is due to more intensive farming and better cultivation of smaller acreage.

Dairying.—Of domestic animals milch cows are the most numerous, amounting to one fifth of the total in the United States. The hill farms are generally difficult to cultivate and profitable only for pasture. Hay is grown on bottom lands in permanent meadows, which are mowed every year and seldom plowed. Many large cities make a market for fresh milk. The 2,500,000 quarts of milk required daily for the city of New York are obtained

chiefly from the country to the north and west as far as Lake Ontario. It is brought in refrigerator cars attached to fast trains a distance of 300 or 400 miles in some cases. The best breeds of cows are kept, and there are individual cows which yield 20 times their own weight of milk in a year. The strictest rules are enforced as to their health and food, and the cleanliness of the stables, milkers, and cans. By this means the death rate among children in cities has been reduced nearly one half. In value of dairy products, New York is second only to Wisconsin among states.

Market Gardening. — The growing of fresh vegetables and small fruits for market is an important industry in the vicinity of all the large cities. Facilities for transportation by land and sea have extended it to great distances. Celery, lettuce, cabbage, asparagus, peas, beans, tomatoes, melons, cucumbers, berries, and other perishable articles are supplied in large quantities by nearly all the Eastern States, and in winter from the Atlantic Coastal Plain as far south as Georgia.

Orchard Fruits. — The Middle West and the Eastern States share equally in the production of three fifths of the orchard fruit of the United States. New York alone is credited with one sixth. Peaches are most abundant on the Coastal Plain from New Jersey to Virginia, and in Michigan. The best apple belt extends from New York to Michigan and Missouri, but the Eastern States produce 36 per cent of the crop and New York twice as many as any other state except Washington (Fig. 131).

Apple growing is most concentrated in a few counties of the lake plain in western New York, where limestone and lake silt soils and the moderating influence upon temperature of a large body of water render the conditions very favorable. Along the "ridge road" which follows a former beach of Lake Ontario, one may ride 120 miles through an almost continuous orchard. Scientific horticulture is practiced on a large scale. The apple tree and fruit are subject to attack by many fungous and insect pests which are controlled by spraying the trees several times a year with liquids fatal to the injurious organism. Careful cultivation, proper food in the form of fertilizers, and more constant attention than would be given to a herd of cattle,

are necessary to secure the best yield in quantity and quality. There are trees still vigorous at the age of 100 years and yielding 50 to 60 barrels of



FIG. 128.—Sorting and packing apples, western New York.

fruit each. The best apples, assorted according to size and quality, are packed in barrels for market (Fig. 128), but the bulk of the crop is dried in specially constructed kilns and exported to Europe.

Grapes.—The Eastern States produce more than half the grapes grown east of the Pacific coast, and New York more than any other state except California. The Chautauqua grape belt occupies a strip of old lake bottom from one to ten miles wide along the shore of Lake Erie and extends through Pennsylvania into Ohio. The deep, narrow valleys of the Finger Lakes (p. 185) are protected from winds and contain at the bottom a body of water which prevents early frosts. The steep valley sides are occupied by extensive vineyards, from which excellent table grapes and wine are produced.

The Decline of Agriculture. — In New England and New York large tracts of land have become, after a century or two of cultivation by the early settlers and their descendants, too poor to yield a living to the farmer. Farms have declined in value to less than the cost of the buildings upon them, and some, abandoned by their owners as unusable, unsalable, and not worth

paying taxes upon, have reverted to woodland. The healthful air and beautiful scenery of hills and valleys, lakes and forests, have attracted many people from the cities to buy these cheap lands (Fig. 129) and to establish estates upon which large sums are spent for pleasure rather than profit. The Berkshire Hills of western Massachusetts are es-



FIG. 129.—An abandoned farm.

pecially famous for beautiful country seats. Thousands of acres of worn-out land have been taken up and reclaimed by foreign immigrants, who succeed in market gardening, dairying, and general farming. A large majority of the descendants of the old New England stock have gone to the cities or to the Middle West, leaving the rural districts to be occupied by people of strange names and habits, who are contented with a lower scale of living.

Fisheries (p. 77). — It has been said that the first settlers of New England would have starved if it had not been for the harvest of the sea. They turned from the barren coast lands and found subsistence in the teeming waters. The cool, shallow waters off the coast abound in cod, halibut, herring, and mackerel. The fishing fleets go out from Gloucester and Boston to "the banks" off Nova Scotia and Newfoundland (Fig. 130), where each schooner sends out small boats carrying two or three men to set and bait the lines attached to a "trawl" or rope half a mile long. The fish are removed and the hooks rebaited every day. The small boats are often lost in a fog or swamped by a storm. The fish are

cleaned and salted on board the schooner, which does not return to port until its cargo is full. The value of the catch of the whole United States is \$110,000,000, or about one sixth as much as that of the eggs laid by the hens. Chesapeake Bay and Long Island



FIG. 130.—Fishing boats off Newfoundland.

Sound are famous for their oyster beds, where the young fry are sown and protected until mature.

Summary.—The surface and soil of the Eastern States are unfavorable for cereal agriculture on a large scale. The rural population are engaged chiefly in dairying, fruit growing, and market gardening. (See Fig. 131.)

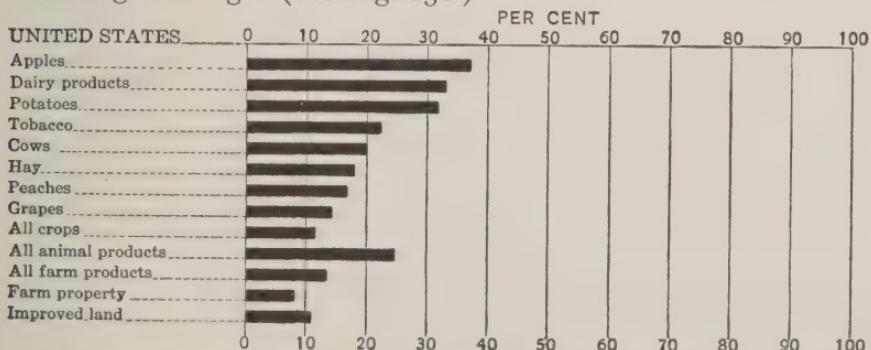


FIG. 131.—Rank of Eastern States in farms and farm products. (See Table III, Appendix.)

QUESTIONS

1. Are the unfavorable conditions for agriculture in the Eastern States due more to climate or to relief and soil?
2. Which requires the greater skill and business ability, to raise and market corn or apples? wheat or milk?
3. Why are fish more abundant north of Cape Cod than south of it?
4. If the Eastern States were as good an agricultural region as the Middle West, would the development of manufactures and commerce be greater or less?
5. Which is the more complex and, therefore, more highly developed, the economy of the Eastern States or that of the Middle West?

CHAPTER XX

THE EASTERN STATES: CITIES

THE urban population of the Eastern States averages 70 per cent, rising in Rhode Island to 96 per cent, in Massachusetts to 95 per cent, in New York to 79 per cent, in New Jersey to 79 per cent, and in Connecticut to 68 per cent. This implies the existence not only of a few very large cities but also of a large number of small cities. In 1920 there were 327 cities of more than 10,000 inhabitants, of which 126 had over 25,000 and 31 over 100,000. There are six metropolitan districts of 500,000 people or over, of which four are seaports, one a lake port, and one a river port. (See Table VII, Appendix.)

New York. — The metropolis of America, the greatest seaport and the largest urban center in the world, could not have attained such a rank without superior advantages of position and site. Situated about midway in the coast line of the Eastern States, New York is about 3000 miles and five to ten days' voyage by steamer from the nearest European ports. Its preëminence among Atlantic ports is due chiefly to its accessibility through the Hudson-Mohawk gap to the Great Lakes and the Middle West. The Erie Canal extended the tributary area of the city to the Mississippi River and eventually to the Rocky Mountains, giving it a start of its rivals which no obstacle could check. The anthracite field 100 miles to the west is another powerful factor for progress which it shares equally with Philadelphia. The forests of the Appalachians, Adirondacks, and northern New England, the brick clays of the Hudson valley (p. 199), sandstone from Connecticut, marble from Vermont, slate from Pennsylvania, and trap rock from New Jersey, contribute to the

construction of the great city. Aside from these the resources of the immediate hinterland are not important.

Site. — The site of New York comprises an assemblage of islands, peninsulas, and arms of the sea scarcely matched elsewhere. The Borough of Manhattan, the heart of the city, is an island thirteen miles long and about two miles wide, between the Hudson River on the west and the East and Harlem rivers on the east. In relief it is a massive ridge of schist which rises from sea level at the south end to a height of 200 feet at the north. The slopes are in some places precipitous. The Borough of the Bronx, a peninsula about six miles across between the Hudson and Harlem rivers and Long Island Sound, resembles Manhattan in relief and structure but is less rugged. The Borough of Brooklyn occupies an undulating surface of glacial hills at the west end of Long Island. The Boroughs of Queens and Richmond are larger in area than the others combined, but are as yet sparsely occupied. The west bank of the Hudson is formed by the Palisades, a high cliff of trap rock, beyond which is a belt of shallow water and tidal marsh four miles wide. The cities of Jersey City and Hoboken cover the lower end of the Palisades ridge, and with Bayonne, Newark, Elizabeth, Orange, Passaic, and Paterson, farther inland, belong, although in another state, to the metropolitan district and are integral parts of the economic city of New York (Fig. 132).

The bodies of water are as important as the land. The Lower Bay is wide open to the sea, roomy and protected, but shallow, and millions of dollars have been spent in dredging deep channels through it for large ships. It is connected through the Narrows, a mile wide, with the Upper Bay, a deep, jug-shaped basin about six miles across. The Hudson River opens into it from the north and the East River from the northeast. These "rivers" are deep arms of the sea in which the currents are controlled by the tides. Newark and Raritan bays on the New Jersey coast are too shallow to be of great commercial importance. The same



is true of Jamaica Bay on the south coast of Queens, but the conversion of these bays into commodious artificial harbors is a possible undertaking which the needs of the future may demand.

Business District. — The shipping, wholesale, and manufacturing center of New York is in the oldest part of the city, at the lower end of Manhattan. It is a triangular area about two miles on a side between the two rivers and

touching the waters of the bay. Its water front is lined with docks, where ships are loaded and unloaded and goods conveyed to and from warehouses by short hauls. Here the high value of land has led to the utilization of space upward in the form of steel-framed "skyscrapers," rising in some cases 750 feet above the street, each housing a population equal to that of a good-sized town. The streets are narrow and resemble canyons (Fig. 133). The business district has extended up-town, crowding out the old residences and most of the churches and other public buildings, until it



FIG. 133.—A city canyon. Pine Street, New York.

occupies about twice the original area. It gradually merges northward into a district of retail shops, theaters, and palatial hotels which extends to the lower end of Central Park. Extensive docks, warehouses, and factories line the Brooklyn side of East River and the Jersey shore of the Hudson, where most of the railroads from the west have their terminal stations. The principal navy yard of the United States is located in Brooklyn.

Residence Districts. — The principal slum or poor residence district is on the lower east side of Manhattan, where the tenement houses shelter

500,000 people to the square mile, a density the highest accurately known in the world. The finest residence district lies on both sides of Central Park and along the ridge in the upper half of Manhattan. To prepare such a surface for occupation by a modern city has involved great labor and expense. The grading of streets and lots means the blasting and removal of huge masses of rock, some of which is used in building. The result has been worth the cost, and for a residence district upper Manhattan presents one of the finest sites in the world. It is solidly built over, largely with apartment houses of seven or more stories, each housing a score or more of families (Fig. 134). The Bronx, Brooklyn, and many suburban towns within fifty miles in all directions are made up chiefly of homes for people whose business is on Manhattan.

Circulation of People and Goods. — The narrow and crowded condition of lower Manhattan, hemmed in by wide and deep waterways, renders the

problem of "rapid transit" peculiarly difficult. The million or more of people who do business there every day have their homes elsewhere. For the passage of these streams of humanity surface cars and omnibuses have long been inadequate. Railroads elevated upon steel trestles form an upper story on many streets, and subways blasted out of the rock beneath traverse the length of the island and are connected by tunnels with Brooklyn and the Bronx. Local and express trains are run through them upon four tracks and carry more than 7 million passengers a day. The East River is spanned by four bridges,



FIG. 134.—An apartment house, Riverside Drive, New York.

but the Hudson, nearly a mile wide and 50 feet deep, has not been bridged. Both rivers are crossed by many ferryboats.

Natural barriers render Manhattan almost inaccessible by railroads, and until recently only two lines reached it, the New York Central and the New York, New Haven, and Hartford. The Pennsylvania Railroad Co. has spent \$50,000,000 in constructing a double tunnel from New Jersey under the Palisades, the Hudson River, Manhattan, and the East River to Long Island, with an immense station in the heart of New York. This company is now expending another \$50,000,000 in bridges across the East River, to connect Long Island with the New England railroad systems. The serious difficulties encountered in building a commercial metropolis upon such a site as that of New York have called for the exercise of the highest engineering skill and have given the city a unique character, in many respects unrivaled for magnificence and beauty. That the difficulties have been overcome and even turned to advantage may be accounted for by the facilities which the site affords for the business of a seaport. These lie in the deep, roomy, and protected harbor and the interlocking of bays, straits, and islands, giving 340 miles of shore line along which docks may be built.

Public Works. — Streets. — In the oldest part of the city the streets have little uniformity of plan, but in the rest of Manhattan they are laid out with mathematical regularity. The longitudinal avenues are spaced to give six blocks to the mile, and the cross streets to give 20 blocks to the mile. The avenues, with a few exceptions, are numbered from east to west and the streets from south to north. Broadway, originally a country road, extends the whole length of the island, following approximately the crest of the ridge. In the lower half of its course it cuts obliquely across the streets and avenues. Above Central Park it lies near the Hudson and widens into a handsome boulevard. Of almost equal importance is Fifth Avenue, which extends midway of the island in a straight line for seven miles. The four bridges, 24 tunnels under the rivers, and the 600 miles of subway and elevated railroad are essential parts of the street system.

Parks. — Of the many parks and squares the most famous is Central Park, two and a half miles long by one half mile wide near the center of



FIG. 135.—The lower end of Manhattan Island, New York. The Hudson River is on the left; the East River with bridges on the right. Notice the docks and the skyscrapers.

Manhattan. Its naturally irregular surface, slightly modified by art, is about one half wooded, and contains lawns, walks, drives, reservoirs, and several small lakes. In the Bronx, a system of large parks, connected by parkways 400 to 600 feet wide, includes about 4000 acres. Bronx Park is occupied by the largest Botanical and Zoölogical Gardens in the world. Brooklyn has a system of beautiful parks comprising more than 1000 acres.

Buildings.—Some of the largest and most imposing buildings of the world stand upon Manhattan Island. In contrast with the famous buildings of the old world, they are not temples, cathedrals, palaces, or parliament houses, but business buildings, designed and erected for economic purposes (Fig. 135). Among these the Woolworth, Singer, Metropolitan, and Equitable buildings are the tallest, the stations of the Pennsylvania and New York Central railroads, the new Post Office, the Hudson Terminal accommodating 10,000 office tenants, the Public Library, the Custom House, and the Municipal Building are the largest and most imposing. Columbia University and the College of the City of New York occupy commanding heights with buildings

worthy of their site, and New York University stands upon a similar site in the Bronx.

Water Supply. — Excellent water is obtained from the Croton River through an aqueduct about 40 miles long, but the supply became inadequate. Another aqueduct 85 miles long to bring water from reservoirs in the Catskill Mountains was then constructed at a cost of \$177,000,000. One of the largest and most important of public works is the maintenance of docks which now utilize about 50 miles of water front.

Commerce and Manufacture. — The accessibility of New York by land and sea, and its unparalleled facilities for transferring goods, bring the port more shipping than comes to any other in the world and nearly one half the total foreign commerce of the United States. Generally there is an excess of imports over exports, made up in part of articles of luxury, furs, laces, gloves, diamonds, and works of art. It is the chief port of entry for sugar, coffee, cocoa, spices, silk, rubber, and hides. Exports of grain, flour, chemicals, copper, machinery, and coal oil are especially heavy. There is always an immense stock and variety of goods in store. Almost anything can be bought there and it is the principal wholesale market for dry goods and groceries in America.

Raw materials, labor supply, and market combine to make New York the leading manufacturing city of the country, its products amounting to 8.4 per cent of the total. Almost every thing is made, but one quarter of the value of the output is in clothing and printed matter. In the refining of sugar and petroleum it leads all other cities, but no statistics are available. It stands first in the clothing, printing, and tobacco industries, second in foundry and lumber products, and third in slaughtering and meat packing.

As a financial center it is no less important. The concentration of capital is enormous and its banks and trust companies are the richest and most powerful in America. The Stock Exchange, the Produce Exchange, and

the Cotton Exchange control the markets, and in the Clearing House all the banks of the United States settle their daily balances.

In literature, New York is the home of the principal publishing houses of books, magazines, and newspapers. About 900 periodicals are printed in twenty languages.

Population. — It took New York about 150 years to grow from a village of 1000 inhabitants to a city of 100,000 in 1810. Fifty years later it had a population of 1,000,000, and in thirty years more nearly 5,000,000. The population of the metropolitan district is now about 7,910,000, exceeding that of London. Its growth has been fed largely by immigration. Nearly all the foreigners who come to the United States land at New York, and a large proportion stay there. Nearly 70 per cent of the population are foreign born or of foreign parentage. Of these, Russians (mostly Jews) are the most numerous. The Germans, Irish, and Italians each number nearly as many, and the four nationalities together make up two thirds of the foreign element. There are but two cities in Germany containing more Germans than New York, only one city in Italy containing more Italians, and the Irish number one eighth as many as there are in Ireland.

There is a strong tendency for those of each nationality to crowd together into one neighborhood, thus forming a foreign community, preserving its own language, religion, and customs. The housing, employment, and education of such a mass of people, who are poor and ignorant of the language and institutions of the country, present the most difficult problems of municipal management. The public school system is an effective means for converting the parents as well as the children into good Americans. The total expenditures for free public schools amount to \$80,000,000 annually. About one third of the working population are employed in trade and transportation and one third in manufacturing and mechanical arts. The average number of families to each dwelling is three.

Summary. — New York does not owe anything, as London does, to political influence. It has not behind it a thousand years or more of history, as have most of the great cities of the world. It is the product of economic conditions and forces, and

the natural result of the exploitation of the resources of a new and rich land. The foundations of its greatness lie in the Middle West, of which it is the financial center and principal seaport. A unique combination of physical features, the interlocking arms of land and sea at the mouth of a gap leading to the greatest of inland waterways, is here the direct cause of a marvelous concentration of people and wealth. The assessed valuation of real estate, land, and buildings only in the City of New York is about 8000 million dollars, a sum larger than the total valuation of all the property in the Pacific division of the United States. About \$600,000,000 are expended annually in new buildings.

Boston. — The position of Boston in relation to the sea is slightly more favorable than that of New York, but in relation to the land it is decidedly less favorable. It is about 200 miles nearer to European ports, but its immediate hinterland is sufficiently hilly and rough to make communication with the Great Lakes and the Middle West difficult. No navigable inlet like the Hudson River or open gap like the Mohawk valley leads from the interior to Boston. Two railroads built to connect the city with the Hudson-Mohawk thoroughfare fail to divert any large share of traffic. Consequently Boston can be little more than the metropolis and commercial center of New England.

Site. — The site of Boston resembles that of New York on a much smaller scale. It stands at the head of Massachusetts Bay, upon islands and peninsulas between the drowned valleys of several small streams. The old city occupies the Shawmut peninsula, originally a pear-shaped eminence attached to the mainland by a narrow neck often swept by the tide. The land was irregular in relief and outline, and large sums have been expended in grading down the hills and filling the coves. The original area of 780 acres has been enlarged to 1830 acres, the surface of which slopes gently from the summit of Beacon Hill to the water front. Charlestown Neck, a high peninsula on the north side of the Charles River, an island at the mouth of the

Mystic River, a third peninsula on the south, and annexed territories on the mainland comprise about 40 square miles. The metropolitan district extends about ten miles in all directions from Beacon Hill, and includes Cambridge, Brookline, Somerville, and other suburban towns (Fig. 136). The harbor, partly closed by sand spits, is about eight miles across and studded with many islands. The ship channel, naturally crooked and difficult, has been improved and marked by buoys and lighthouses.

Business District. — The enlarged Shawmut peninsula, now nearly circular in outline and about one mile across, is almost entirely devoted to commerce and public affairs. The streets, said to have been originally cow-paths, are still narrow and irregular.

After a great fire in 1872 they were widened and straightened and now somewhat resemble in plan a spider's web. On the highest point near the center stands the Statehouse, from which streets radiate in many directions. Atlantic Avenue runs around the water front, which is bordered on the harbor side by extensive docks. Washington and Tremont streets are the principal thoroughfares. Charlestown, the island of East Boston, and the peninsula of South Boston are also provided with docks and are largely devoted to commerce and manufacture.

Residence Districts. — The finest residence district, called the Back Bay, has been made by filling the shallows of Charles River. The streets are laid out in regular rectangles, the central Commonwealth Avenue being a parkway 240 feet wide. Most of the better residences are in the suburban districts. The foreign quarter occupies Chelsea and other districts north of the harbor.

Public Works. — Boston was one of the first cities to construct an extensive subway. It is about three miles long, extending from the Common under the business district and the harbor

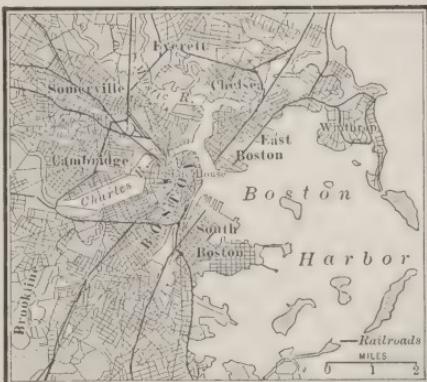


FIG. 136.—Boston and vicinity.

to East Boston. There are two large railway stations near the business center. Boston Common, on the south slope of Beacon Hill, was at first a cow pasture, and has been public land for nearly 300 years. It is now a wooded park of 48 acres. Adjoining it are the Public Gardens, devoted to flower beds and other ornamental works. These are connected through Commonwealth Avenue with a unique system of outer parks in two concentric rings, the inner comprising 2300 acres and the outer 10,000 acres. A bridge to Cambridge includes a dam in the Charles River which converts it into a fresh-water basin for boating. Public water supply is obtained from reservoirs fed by several small streams.

The greatly enlarged Statehouse occupies a conspicuous position on the summit of Beacon Hill. Its gilded dome and the shaft of Bunker Hill Monument in Charlestown serve as landmarks and guides for the traveler in the bewildering streets of the old city. Among many objects of historic interest are three old burial grounds maintained in the heart of the city where land is of the highest value; the Old South Church, now a historical



FIG. 137.—Commercial district, Boston. Faneuil Hall in the background.

museum; the Old Statehouse; and Faneuil Hall, called "the Cradle of American Liberty" (Fig. 137). In the Back Bay district the new Old South Church, Trinity Church, the Public Library, and the Museum of Fine Arts are noted specimens of architecture. In Cambridge are the extensive grounds and buildings of Harvard University and the Massachusetts Institute of Technology. Wellesley College for women is located in the suburb of Wellesley.

Commerce and Manufacture. — Under the competition of New York, Portland, and Montreal, the commerce of Boston has relatively declined and become secondary to manufacturing, in which the metropolitan district ranks third among eastern cities. Among the distinctive industries are boots and shoes, printing, leather, clothing, textiles, electrical machinery, sugar refining, pianos, organs, and shipbuilding. The United States maintains a well equipped navy yard at Charlestown. In foreign commerce the value is second among eastern ports, being about one ninth that of New York. The leading imports are fibers, wool, hides, cotton, sugar, coal, and leather. In the export of cattle, meats, and dairy products Boston is second only to New York.

Population. — The population of Boston in 1920 was 748,000, and of the metropolitan district about 1,700,000, the fourth in the United States. In the city nearly 75 per cent of the population are of foreign birth or of foreign parentage. This part of the population had its origin chiefly in Ireland, Canada, Russia; and Italy.

Philadelphia. — "The City of Brotherly Love," 90 miles south of New York, and previous to the opening of the Erie Canal the metropolis of America, shares with that city many advantages of sea and land. It is the third city of the United States, and third Atlantic seaport, with a foreign commerce a little less than that of Boston. In contrast with New York and Boston, it is 100 miles from the sea on the tidal Delaware River at the mouth of the Schuylkill, but is accessible by the largest vessels.

Site. — The ground upon which Philadelphia stands rises from tide level at the junction of the two rivers to a hilly tract on the north, a distance of about 16 miles. The surface is level or gently rolling and there are no natural barriers to expansion or to easy access and communication. The plan of the city is throughout extremely regular (Fig. 138).

The Delaware River front of about 20 miles is largely occupied by docks, freight terminals, factories, and wholesale houses. The principal hotels, stores, banks, office buildings and railway stations are near the City Hall (Fig. 139). In the same neighborhood are many fine residential streets. The picturesque suburbs on the north and west are occupied by beautiful villas of recent construction. There is a small congested tenement district in the southeast. The greater part of the city consists of street after street of plain, two or three story brick houses, each occupied by a single family. On account of the level, open, and unobstructed site, the business and residential districts are less distinct than in

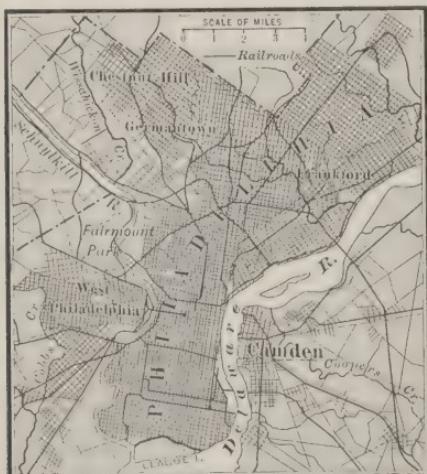


FIG. 138. — Philadelphia and vicinity.

other large cities, and the number of residences nearly equals the number of families.

Public Works. — Fairmount Park extends along the Schuylkill and one of its tributaries eleven miles and comprises 3500 acres. The park contains many historic mansions, statues, and monuments of art. The City Hall is one of the largest buildings in the world, covering a space of four and one half acres. The city was the first capital of the United States and contains a larger number of historic buildings than any other. Among them are Independence Hall, now a historical museum, where the Continental Congress met and the Declaration of Independence was written; Congress Hall, in which Washington was inaugurated; and Carpenter's Hall, in which the First Continental Congress met. Philadelphia has an unusual number of schools, learned societies, libraries, and museums, including the University of

Pennsylvania, Girard College, and Jefferson Medical College. Bryn Mawr, a leading college for women, is a few miles outside the city.

Manufacture and Commerce. — Philadelphia has always been one of the greatest manufacturing centers of the United States, and the metropolitan district ranks next after New York and Chicago. It stands first in the manufacture of carpets and rugs,



FIG. 139. — Broad Street, Philadelphia. City Hall in the distance.

second in that of woolens, worsteds, hosiery, felt hats, and leather, and third in clothing, foundry products, and printing. Other large industries are cotton goods, iron and steel, malt liquors, and chemicals. It is the seat of large petroleum and sugar refineries, the Baldwin Locomotive Works, and the Cramp shipyards, where steel vessels and warships are built. The United States maintains a large navy yard at League Island below the city.

The dock line extends about 10 miles along the Delaware River, and there are many regular steamship lines to Europe and the West Indies. In foreign tonnage it is the third seaport of the United States, with a total over one fifth that of New York; but in total value of exports and imports it is surpassed by Boston. The principal imports are raw sugar, chemicals, goatskins, wool, and hides, and the principal exports are iron and steel, petroleum, wheat, and cattle. Its inland communications are by the Pennsylvania and the Baltimore and Ohio systems, by which it is closely connected with the Pittsburgh iron district. Its distance by rail from Chicago and Lake Erie is about the same as that of New York, but the grades and curves are more difficult. The Philadelphia and Reading Railroad connects the city with the anthracite region.

Population. — The population of Philadelphia in 1920 was 1,824,000 and of the metropolitan district over 2,250,000. In the city 54 per cent are of foreign parentage, of which nearly one fourth are Irish.

Summary. — There can be no better example of the influence of natural features upon the development of cities than a comparison of New York and Philadelphia. Previous to 1830, Philadelphia was the metropolis and principal seaport of America. In position and distance from Europe, the Middle West, and the coal fields, neither city had any considerable advantage over the other. The site of Philadelphia for city construction was far superior, but its restricted harbor accommodations and the lack of a gap through the mountains behind it were fatal to its commercial supremacy.

Baltimore. — In being an inland seaport Baltimore resembles Philadelphia. It stands near the head of Chesapeake Bay, 170 miles from the sea and has an excellent harbor in the drowned valley of the small Patapsco River and its branches.

Site and Plan. — The ground on which Baltimore is built presents a pleasing variety of relief not too rough for successful improvement. The city is compact, covering an area about five by six miles. The shipping, manufacturing, and business districts lie in the southeast near the harbor, the better residence districts in the northwest (Fig. 140).

The business center was destroyed by fire in 1904, and the new buildings, restricted to a height of 185 feet, are mostly of three or four stories. The parks and squares, of which Druid Hill is the largest, aggregate about 2300 acres. The first monument in the country in honor of George Washington, erected in 1815-1829, and the Battle Monument, erected about the same

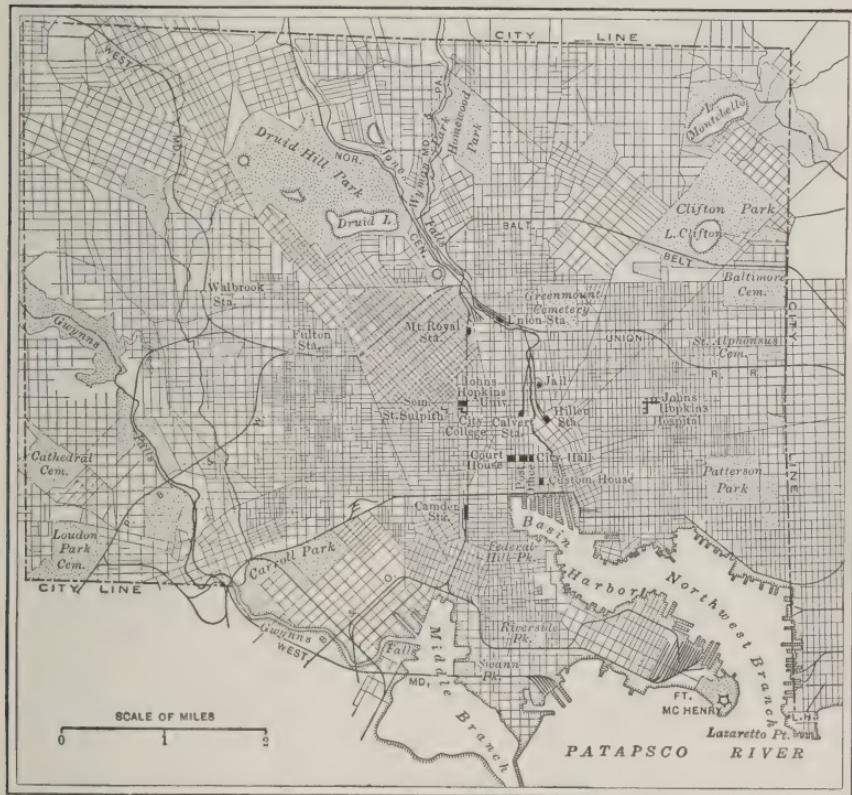


FIG. 140. — Baltimore and vicinity.

time in memory of those killed in defense of the city against the British, have given to Baltimore the name of "the Monumental City." It is the seat of Johns Hopkins University, the foremost graduate school in the United States.

Commerce and Manufacture. — The foreign tonnage of Baltimore has grown more rapidly than that of any other eastern seaport, and in value its commerce is more than half that of Phila-

adelphia. Its western gateway is the Potomac valley, traversed by the Baltimore and Ohio Railroad. The fruit belt of the Coastal Plain and the oyster beds of Chesapeake Bay are in its immediate tributary area and give rise to a large canning industry. It stands next to New York and Chicago in the manufacture of men's clothing. Copper, tin plate, sheet iron, meats, tobacco, brick, and fertilizers rank high among its products.

Population. — In 1920 Baltimore was the eighth city in the United States, with a population of 734,000. In 1919 the district stood eighth in value of manufactures. The foreign element is less than one third.

Pittsburgh. — The chief iron and steel center of the United States, and one of the greatest in the world, has its economic

basis in a seam of coal 16 feet thick which outcrops along the Monongahela River for about 100 miles. The occurrence of coal and ore near the confluence of two rivers forming the Ohio established the iron industry there about 100 years ago. The nearness of Pittsburgh to Lake Erie

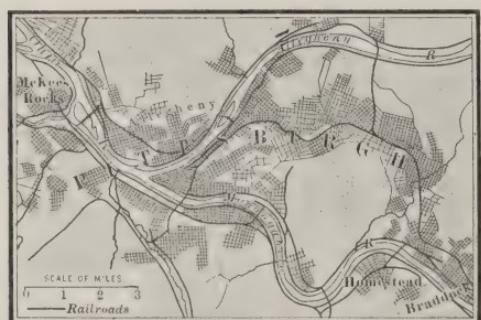


FIG. 141. — Pittsburgh.

ports, only 125 miles distant, enabled the industries already established to avail themselves of the Lake Superior ores and to expand to dimensions which the home supply could not support. To these resources were added timber, petroleum, and natural gas.

Site. — The industrial city extends along the three rivers more than 20 miles with a center at their confluence called "The Point" (Figs. 141, 142). The valleys are narrow and bordered by steep bluffs. The residential districts are on the plateau between them. Surrounded by a belt of furnaces and factories, it has won the title of "the Smoky City."



FIG. 142. — "The Point," Pittsburgh. Notice barges loaded with coal and pushed by steamers.

There are four parks, comprising about 1200 acres. The most notable institution is the Carnegie Institute in Schenley Park, established by a gift from Andrew Carnegie of \$19,000,000. It includes a library, art gallery, music hall, scientific museum, the largest botanical conservatory in America, and various technical schools. Associated with it are the Allegheny Observatory and schools of mining, engineering, law, medicine, pharmacy, and dentistry, the whole constituting the University of Pittsburgh.

Commerce and Manufacture. — The rivers are of more importance to Pittsburgh than to any other inland city. They have been improved by locks and dams, and are used for the transportation of coal, steel rails, and other heavy freight, amounting to about 9 million tons a year, or two thirds of the total tonnage of the Mississippi River system. A ship canal to connect Pittsburgh with Lake Erie is projected and would be of great service. It is on one of the two great lines of transportation between the Middle West and the Eastern States, and is the most important midway station on the Pennsylvania and the Baltimore and Ohio

railroad systems. The freight yards have a capacity of 60,000 cars and the freight handled amounts to 150 million tons a year.

In value of manufactures the metropolitan district stands eighth in the United States, and in iron and steel products stands first. The establishment of the industry at Gary in the Chicago district and other centers has diminished the relative importance of Pittsburgh, but it still produces 18 per cent of the pig iron, and 19 per cent of the steel made in the United States. It contains the principal plants of the United States Steel Corporation. Other important products are castings, machinery, cars, tin plate, and glass.

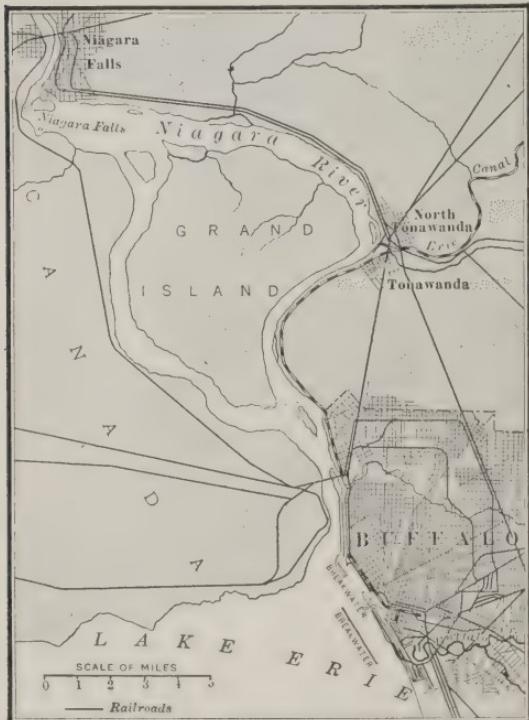


FIG. 143.—Buffalo and vicinity.

Population.—The population of the city in 1920 was 588,000 and of the district over 1,100,000, the fifth in the United States. The foreign element in the city is nearly 60 per cent and includes considerable numbers of nearly every European nationality.

Buffalo.—The city at the point where the waterway of the Great Lakes and the Mohawk-Hudson route meet holds a position of great advantage. The falls of Niagara, 20 miles below Buffalo, prevent most of the lake traffic from continuing by water to Lake Ontario and the St. Lawrence, and furnish the city with the largest and cheapest water power in the world.

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Site and Plan.—Buffalo occupies an area extending from Buffalo Creek along the Erie and Niagara shore about ten miles and rising gradually from the water to a height of 80 feet. Numerous streets radiating from the business center near the lake front give direct access to all quarters of the city. The main streets are unusually broad and in the residence district are lined



FIG. 144.—Unloading wheat from a lake steamer into an elevator, Buffalo.

with noble trees. The park system of about 1000 acres encircles the city.

Commerce and Manufacture.—Buffalo is connected by steamship lines with all the lake ports, and its foreign tonnage (3,336,-000) is the largest of all the ports on Lake Erie. The harbor is protected by breakwaters and provided with ten miles of piers and wharves. It is the lake terminus of the Erie Barge Canal and is connected with the Atlantic seaports by the New York Central, Lehigh Valley, Lackawanna, and Erie railroad

systems, and with Chicago by the Lake Shore, Michigan Central, Nickel Plate, Wabash, and Grand Trunk systems. It is the most important way station on the northern east-west route. It is a distributing center for the manufactured products of the Eastern States and the foodstuffs and raw materials of the Middle West, which are here transferred from lake to canal boat or car. Its grain elevators (Fig. 144) have a capacity of 20 million bushels and it is one of the principal markets for wheat, flour, cattle, hogs, horses, fish, lumber, and coal. Its foreign trade, chiefly with Canada, amounts to about \$250,000,000 a year.

The Buffalo district includes the manufacturing plants at Niagara Falls and the blast furnaces and steel mills at Lackawanna, where water transportation for ore and the short haul for coal from Pennsylvania, make it possible to produce iron and steel at less cost than at any other plant in the Eastern States. The city is supplied with light and power by electric current from Niagara, which is used in a great variety of industries. Meats, foundry products, flour, automobiles, lumber, and soap make up about one third the total value of manufactures. Other important establishments are petroleum refineries, ship yards, copper smelters, and car works.



FIG. 145.—Washington, D.C.

Population.—The population of Buffalo in 1920 was 507,000. Excellent drainage, pure water from the Niagara River, the use of electric power which does away with "the smoke nuisance," wide streets, and abundance of trees render Buffalo one of the most attractive and healthful of cities.

Washington.—A city which owes nothing to industry or commerce, but is devoted wholly to governmental purposes, is an economic product only in the highest sense of the term. Washington was arbitrarily located by Congress and designed solely as the Federal capital (Fig. 145). It occupies the



FIG. 146.—Washington, D.C. The Capitol and the Library of Congress in the middle distance.

whole area (60 square miles) of the District of Columbia at the head of navigation on the Potomac River. Except for low grounds along the river, the site is hilly and picturesque. The Capitol (Fig. 146) and the presidential mansion, or "White House," occupy commanding heights about a mile apart. Radiating from these centers, diagonal avenues, named after the states, intersect in every direction the regular pattern of streets, furnishing many opportunities for small parks. The streets and avenues are 80 to 160 feet wide and with parks and public grounds occupy one half the area of the city. These features, combined with the large number of public buildings and monuments, which are among the most beautiful and imposing in the world, make Washington "a city of magnificent distances," unique in America. Its population of 438,000 is made up mostly of government officials and employees.

Summary.—Superior facilities for manufacture and commerce make the Eastern States the only region in America which

resembles the countries of western Europe in density of population, number of great cities, and concentration of wealth.

Economic Rank. — The Eastern States, considered as an economic unit, belong to the third type of complex societies (p. 92) which import most of their foodstuffs and raw materials, and export manufactures.

QUESTIONS

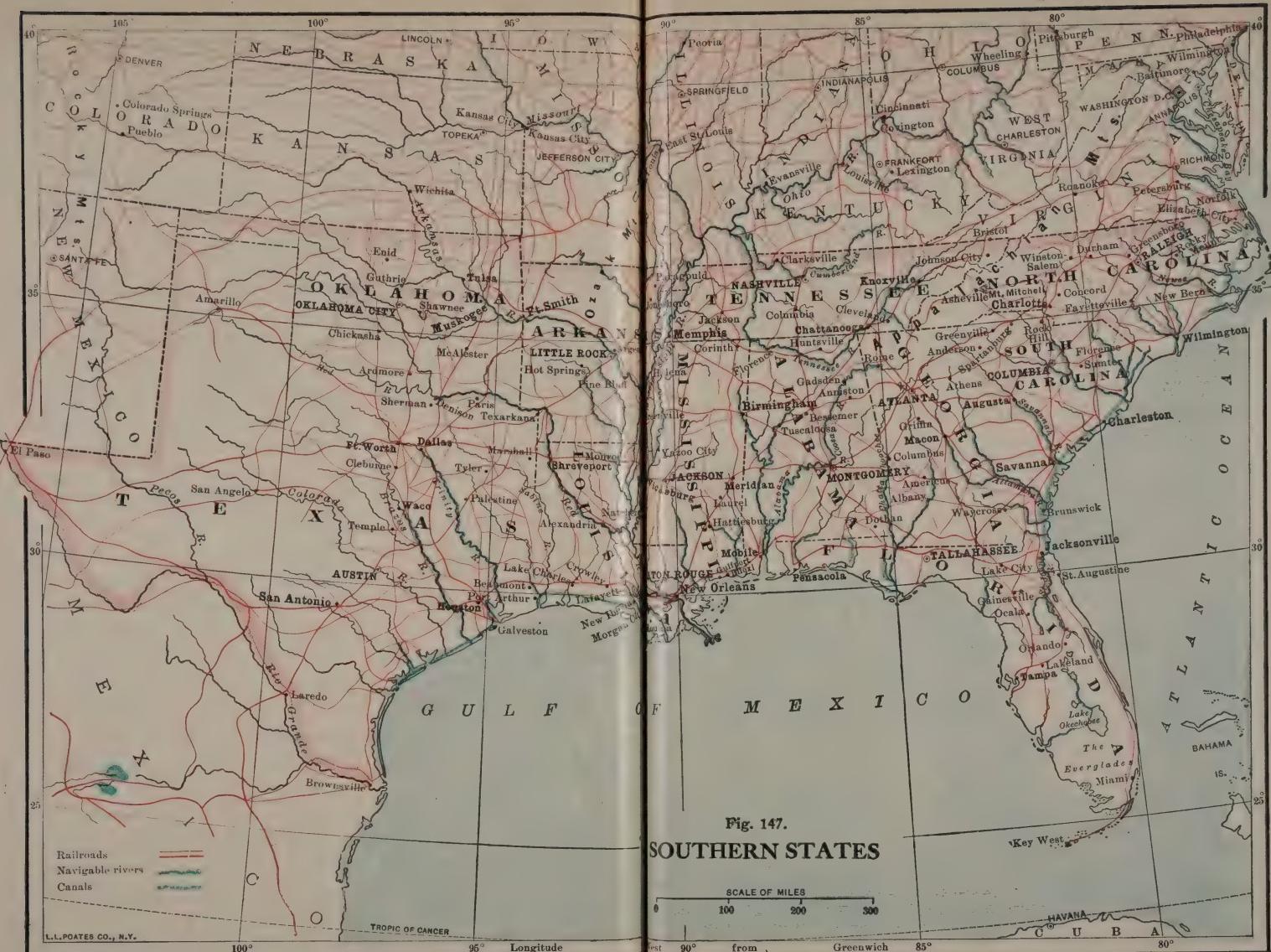
1. What are the economic effects of the existence of the Hudson-Mohawk gap?
2. Why is the seaport on the Hudson River located at its mouth instead of near the head of tidewater, as on the Delaware and Chesapeake?
3. What are the natural advantages of the site of New York for a seaport? What disadvantages had to be overcome?
4. Of what use are parks in a city?
5. What natural conditions have prevented Boston from being as large as New York?
6. Steamers leaving Philadelphia fill their boilers with water from the river. Sometimes it is found to be salt and unfit for use. Explain.
7. Why are the people of Philadelphia better housed than the people of New York?
8. Why has Baltimore a much smaller proportion of foreign population than New York or Boston? Is that an advantage?
9. What natural conditions have made Pittsburgh the leading iron manufacturing city of America? the second or third in the world?
10. What natural conditions favor the growth of Buffalo beyond that of any other lake port except Chicago?

CHAPTER XXI

THE SOUTHERN STATES

Boundaries. — The southern part of the Atlantic division of the United States constitutes a well-marked economic region, distinguished by relief, climate, products, and occupations. The northern boundary of this region does not coincide with the historic line separating the former slave or Confederate States, commonly called "The South," from "The North." The states of the northern tier are in a transition belt and have been included in the Middle West and Eastern States. The limits of the economic region are fixed by the long, hot summers and short, mild winters of the warm, temperate zone; more precisely by the northern limit of seven months without frost (Figs. 30, 35). The fact that the cotton belt is confined to this region is a better indication of its climate than average temperatures. The natural boundary on the west is formed by the rainfall line of 20 inches, the contour line of 2000 feet, and the margin of the steppe, which approximately coincide along the 100th meridian (Figs. 29, 33, 147). About 15 per cent of the total area of the Southern States, in western Texas and Oklahoma, belongs naturally with the Interior States. The other boundaries are the Rio Grande, the Gulf of Mexico, and the Atlantic Ocean.

The region comprises the states of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Oklahoma, Arkansas, and Tennessee. These correspond to the South Atlantic, East South Central, and West South Central groups of the Census Bureau, except the northern transition states, Delaware, Maryland, Virginia, West Virginia,



and Kentucky. The area is 26 per cent of the United States (excluding the western plateau region, 23 per cent) and the population is about 24 per cent. Its economy is preëminently agricultural, more than 50 per cent of all employed persons being at work upon the land. The only large food crop is corn. Cotton constitutes one half the total value of agricultural products, 90 per cent of the crop of the United States, and 66 per cent of the world's crop. The region might well be called the cotton belt. (See Figs. 36, 37; Table III, Appendix.)

Relief. — The physical features of the Eastern States described on page 183 extend far into the Southern States. The Coastal Plain (Fig. 33) occupies more than one half the surface, rising from the ocean waters to a height of 500 feet at its inner border. From Virginia to Alabama it is from 150 to 200 miles wide. A part of it, called the Mississippi Embayment, projects northward from the Gulf to the mouth of the Ohio and includes Louisiana, Mississippi, half of Alabama and Arkansas, and a portion of Tennessee. The coastal plain of Texas is about 200 miles wide. Along the coast a belt of shallow sounds, lagoons, islands, and marshes extends from Chesapeake Bay to the Rio Grande. The general surface of the plain is smooth, flat, or slightly undulating, and slopes gently toward the sea. It is crossed by many parallel streams which have cut wide and shallow valleys. It is underlaid by strata of soft sands, silts, and clays, the waste of the old Appalachian Mountains deposited on the sea bottom. It has only recently been elevated above the sea and is the newest land in North America.

The Fall Line. — The inland border of the Coastal Plain is marked by a low but rather abrupt rise to the Piedmont Plateau. As the streams cross it from the plateau to the plain, they descend by falls or rapids. Above this line the valleys are narrow and rocky, below it wide and sandy. In the larger rivers it is the head of tidewater and navigation. The presence of water power at these points and the transfer of goods from water to land carriage have determined the sites of Raleigh, Columbia, Augusta, Macon, Columbus, and Montgomery (Figs. 33, 147).

The Piedmont Plateau. — This low, worn-down plateau extending from the Hudson River to central Alabama occupies about seven per cent of the Southern States. It is broadly undulating and diversified by low, rounded knobs and ridges, and deep, narrow valleys. It is sharply distinguished from the Coastal Plain by its red clay and gravel soils produced by the weathering of the underlying granite, gneiss, and other crystalline rocks.

The Appalachian Mountains and Plateau. — In western North Carolina, eastern Tennessee, and northern Georgia, the Blue Ridge (p. 37) expands to a width of 75 miles and rises to the highest elevation in eastern United States. Mt. Mitchell is 6711 feet above the sea and a score of peaks rise above 6000 feet. The Great Appalachian valley, about 50 miles wide, drained by the Tennessee and Coosa rivers, lies between the Blue Ridge and the Cumberland Plateau. These highlands decline westward and southward to central Tennessee and Alabama, where they disappear beneath the sediments of the Coastal Plain.

The Ozark Highlands. — Northwestern Arkansas and southern Missouri are occupied by the low Ozark Plateau. South of the Arkansas River a belt of low mountain ridges extends westward from central Arkansas through Oklahoma. There are a few summits above 2000 feet. The whole group stands like an island in the midst of the plains and repeats on a small scale the features of the Appalachians.

The Great or High Plains. — About one half of Texas is occupied by the southern portion of the Great Plains Plateau which will be more fully described in connection with the Interior States (p. 305). This plateau, which is in part above 2000 feet, is generally smooth and bordered by steep bluffs.

The Alluvial Valley of the Mississippi. — Through the middle of the Gulf Coastal Plain the alluvial valley of the Mississippi extends 600 miles. It is a low, level tract, 25 to 80 miles wide, bounded by bluffs and covered by the river at times of high water. In the natural state of the river, the flood waters spread out over the valley floor, leaving a thin layer of soil. Such lands are ex-

ceedingly productive, but difficult to occupy and utilize. The Federal and state governments have spent many millions of dollars in constructing levees or embankments of earth by which about three fourths of the valley is now protected from floods. It is traversed by many bayous, or side channels of the river, and much of it is swampy. The banks of the streams are higher than the land farther away and furnish sites for most of the houses and towns.

The Peninsula of Florida. — Florida differs from the rest of the Coastal Plain in being underlaid by limestone. The flat surface, mostly less than 100 feet above the sea, is dotted with innumerable sloughs, ponds, shallow lakes, and swamps, among which the largest are Lake Okechobee and the Everglades. The surface streams are very irregular and a large part of the drainage is underground through passages dissolved out of the limestone.

Drainage. — The rivers of the Coastal Plain do not unite into systems but flow from the interior highlands by independent parallel courses to the sea. The lower Mississippi has an exceedingly crooked channel through the alluvial plain, flowing more than 1000 miles to reach the Gulf. Its principal eastern tributary is the Tennessee, which drains the great valley from Virginia to Alabama and there turns abruptly northward to the Ohio. On the west the Arkansas and Red rivers bring water from the High Plains and Rocky Mountains.

Coast Line. — The coasts of the Southern States are everywhere low and generally bordered by lagoons and barrier beaches (p. 188). There are many shallow sounds and inlets at the river mouths but no deep estuaries. The Mississippi has built at its mouth one of the largest deltas in the world, from which it escapes through a cluster of forked channels called "passes" (Fig. 165). There are no harbors naturally accessible by the largest vessels, but the harbors at Charleston, Savannah, Mobile, Galveston, and the mouth of the Mississippi have been deepened to admit them. Ports for small coastwise shipping are numerous.

Climate. — While the average temperature of the coldest month is above freezing (Fig. 31), the northwest winds from the interior of the continent in winter carry cold waves with frost, snow, and occasional zero temperatures to the Gulf and Atlantic coasts. Only the Florida Peninsula and the extreme south of Texas are safe from them. The growing season is from seven to ten months (Fig. 30). The extreme summer temperatures are not so high as in the northern and Interior States. The rainfall ranges from 20 inches in the west to more than 60 inches on the east Gulf coast and the high mountains. It is generally above 40 inches and is well distributed throughout the year.

Vegetation. — The dry, sandy uplands of the Coastal Plain were originally covered by a forest of long-leaf and pitch pine while the swamps were occupied by cypress, which flourishes in standing water. The plateaus and mountain slopes bore a dense forest of hardwood timber, oak, hickory, chestnut, walnut, tulip, basswood, and poplar mixed on the highest elevations with spruce and hemlock. In Texas the wet lands are grassy prairies and savannas separated by tracts of pine forest, the boundaries being irregular and shifting. From Louisiana eastward the coast is bordered by a strip of evergreen, broad-leaved forest containing live oak and magnolia. In southern Florida this passes into a subtropical vegetation of palms, palmetto, and mangrove. The Everglades are mostly covered with sawgrass.

Health and Pleasure Resorts. — The climate and scenery of the southern Appalachians are delightful and attract many summer visitors, for whom Asheville, N.C., is the principal center. The east coast of Florida is lined with hundreds of winter resorts, many of which contain palatial hotels for the entertainment of wealthy northern visitors. The genial and equable climate of Florida on the edge of the trade winds and beyond the reach of cyclonic changes of weather, permits outdoor life at all seasons and attracts thousands of transient and permanent residents in search of health or pleasure.

Summary. — In relief the Southern States combine the wide plains characteristic of the Middle West with the rugged high-

lands of the Eastern States. The soils are generally inferior to the glacial soils of the north. The highlands provide timber, minerals, and water power. The coast line favors marine commerce. The most important natural economic factor is the mild climate with abundant rainfall.

QUESTIONS

1. Which is most nearly uniform in relief, the Middle West, the Eastern States, or the Southern States? (See Fig. 33.)
2. What are the advantages of uniform relief? the disadvantages?
3. What part of the eastern half of the United States has the most equable climate?
4. Which tends to make people more energetic, an equable or a variable climate?
5. How does the coast line of the Southern States differ from that of the Eastern States? Why is one more favorable for commerce than the other?
6. Of what value to the Southern States is the Appalachian Highland?
7. To what are the extent and variety of forests in the Southern States due?
8. Why are the banks of the rivers and bayous higher than the rest of the Mississippi flood plain?
9. Why do the people living on the flood plain use boats instead of carriages and wagons?
10. How has the Mississippi delta been made? Is it still growing?

CHAPTER XXII

THE SOUTHERN STATES: AGRICULTURE

Cotton. — The Southern States grow about two thirds of all the cotton used in the world, and thus contribute a large share to the clothing of all mankind. The distribution of the raw cotton and the goods made from it gives rise to more commerce than that of any other article except food-stuffs. Its manufacture into cloth and garments is one of the world's great industries (Chap. XII). The cotton plant is a small bush whose seeds are inclosed in a pod and covered with white hairs or fibers, which when separated from the seeds constitute the "lint" or raw cotton of commerce. At maturity the pod bursts open, and the seed and fibers are disclosed (Fig. 148). For a full crop the plant requires a growing season of seven months, continuously warm but not hot, and with a good but not excessive rainfall. In very hot and wet climates the plant will live for years, but its production of seeds and fiber is small. Consequently, it is more profitable in the warm temperate than in the tropical zones.



FIG. 148. — Cotton bolls.

History. — Centuries before the Christian era, cotton was used in India, which was long the chief center of production. Columbus found it growing wild in the West Indies, whence it was brought to the Southern States at an

early period in their history. After the introduction of negro labor and the invention of the gin (p. 214) it became the most profitable of crops and the economic "king" of America. The pine forests were cleared and planted, and after a few crops the land was abandoned and a new piece cleared. This one-crop system was very profitable as long as land and slave labor were cheap and plentiful, but it will take the cotton states a long time to recover from such a wasteful and ruinous method of agriculture.

Culture. — There are several varieties of the plant, of which the sea-island cotton, grown along the coast of South Carolina



FIG. 149. — Part of a cotton field at picking time in Louisiana.

and Georgia, produces the longest and silkiest fiber. Most of the crop is known as upland cotton. The seed is planted in March and April in rows which are afterwards thinned out to give each plant the space needed according to the soil and expected growth. The crop is cultivated with plow and hoe like corn until the plants are four or five feet high and covered with

blossoms resembling a small hollyhock. The pods begin to ripen in August and continue until frost. The fiber and seeds are picked from the pod generally by hand (Fig. 149). The work is light and can be done by women and children, but the necessity of going over the field several times increases the cost of picking and limits the acreage that can be harvested. Cotton-picking machines which blow the cotton into a sack by a blast of air have been tried, but are not yet in common use. The cotton is hauled by wagon to the gin, where the seeds are separated and the lint is compressed into bales weighing about 500 pounds. One half bale to the acre is an average yield.

System. — The cotton planter is always sure of a fair market for his crop, and as soon as it is baled it is good for cash. Most of the planters, especially the negroes, have little or no capital and it is customary to rent ten or twenty acres, according to the number of working members in the family, and, in some cases, even to mortgage the crop to a banker or merchant who supplies the planter with the tools, clothing, and food needed until the crop is sold. The more enterprising and thrifty planters acquire capital, buy land, and become independent. Little else than cotton is raised, and mules, hay, corn, pork, and butter are imported. The boll weevil, an insect which has recently appeared in Texas, destroying the crop by boring through the green pod, may prove a blessing in disguise. It encourages the raising of corn and cattle, for which the region is well adapted, and tends to break up a bad system of one-crop farming.

Cotton is raised in almost every county of the Southern States (Fig. 150), but the most productive soils are the prairies of Texas, the alluvial valley of the Mississippi, and the upper coastal plain of Alabama. Texas produces one fourth of the crop, and Arkansas and Georgia one fourth (Fig. 151). The total crop in good years amounts to 15 million bales, more than half of which is exported. There is enough suitable land in the cotton states to multiply the acreage by ten.

Cotton Seed. — The seed of the cotton plant, formerly thrown away or used to fertilize the fields, is now worth as much as wheat. It is ground and pressed to extract the oil, which is used for

making soap and as a substitute for lard and olive oil in human food. The cake from which the oil has been pressed is fed to dairy cows and is as good as corn for fattening cattle.

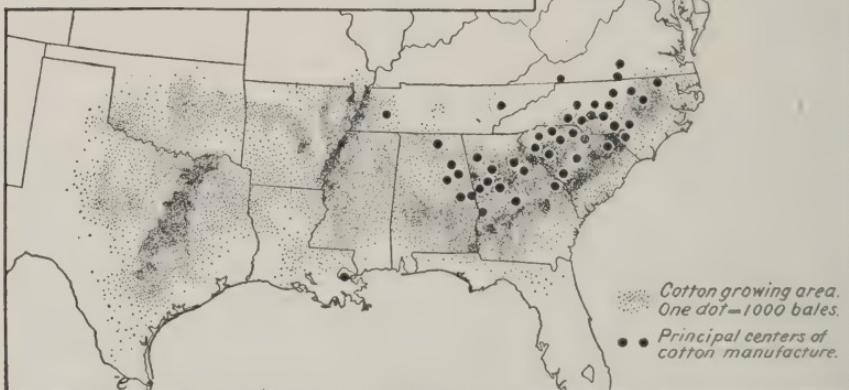


FIG. 150.—Distribution of cotton and cotton manufacture in the United States.

World's Cotton Crop.—The monsoon countries of Asia, India, and China stand next to the United States in the production of cotton. It is also grown in small areas in Persia, Turkestan, Turkey, and the Mediterranean countries.

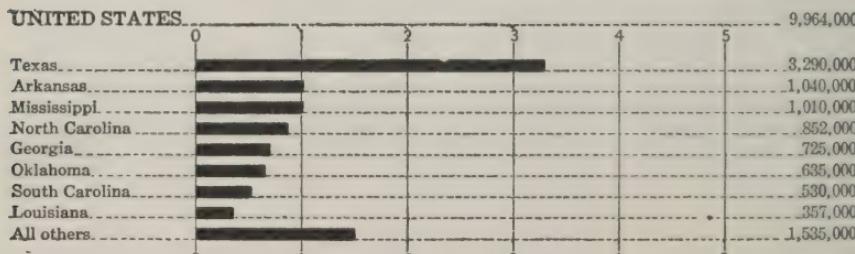


FIG. 151.—Production of cotton (1922), by states, in millions of bales.

countries. In the Nile valley the yield per acre is twice as much as in any other country and of excellent quality. A little is raised in Peru and Brazil. European countries are making special efforts to increase the cotton crop of their tropical colonies and dependencies.

Rice. — Rice, in its general appearance, resembles oats, but thrives only in warm regions of heavy summer rainfall. In southeastern Asia the monsoon winds bring the rains necessary for the growth of the crop, which is the staff of life for nearly half the human race. There are varieties which grow on dry uplands; but dense populations can be supported only by lowland rice, which requires irrigation and flooding.

The fields must be leveled to secure uniform depth of water. On the flood plains of rivers this is comparatively easy, but hill slopes must be terraced at a great outlay of labor. The seeds are sprouted in beds, transplanted to the fields, and flooded with water (Fig. 152), which must be kept in gentle motion, drawn off at intervals during growth, and finally before the crop ripens. This work is done largely by hand, including in many cases carrying the water in buckets. The cutting, drying, and threshing of the grain is done with the simplest tools and without the use of animal power. The husk, which fits the grain closely and preserves it indefinitely, is loosened by pounding the portion used each day. Rice is not ground to make bread, but the whole grains are boiled and eaten with spices and fruit. This, with peas and beans, which take the place of meat, constitutes the food supply of hundreds of millions of people. To provide it by these primitive methods is one of the greatest achievements of human diligence. The rice crop of the



FIG. 152. — Flooded rice field, Louisiana.

world, about 175,000 million pounds, is comparable with that of wheat or corn. India, China, and Japan produce 80 per cent.

Rice in the Southern States. — Rice has been grown along the seacoast and river valleys of South Carolina and Georgia from an early period, but recently this industry has been undertaken on a large scale in Louisiana, Texas, and Arkansas. The Oriental methods suited to slave labor have been superseded by the use of modern machinery. Water is supplied by steam pumps, the ground is plowed and harrowed by teams, and the grain is reaped and thrashed by machines, similar to those used for wheat. An American farmer with machinery can raise fifty times as much rice as a Chinese farmer by hand labor. For use in this country the grain after it is hulled is generally "polished" by a special machine. The crop of about 35 million bushels is not sufficient to supply the home market. The acreage could be easily doubled.

Other Cereals. — The corn crop of the Southern States is important and increasing (Figs. 40, 42). Corn is the chief food product, and is used directly for bread to a larger extent than in the Middle West. Wheat (Figs. 44, 46) and oats are of importance only in Oklahoma and central Texas, where the rainfall is similar to that of the northern grain states.

Fruits. — Peaches, melons, strawberries, and other small fruits are extensively grown in the Southern States for northern markets. Oranges, formerly imported from Sicily and the Mediterranean countries, are now supplied in abundance from Florida and California and are about as cheap as good apples. Pineapples and bananas are grown to a limited extent in the United States, but are imported largely from the West Indies and Hawaii. Bananas, probably the most prolific of tropical fruits and perhaps of food crops, are brought from Jamaica and Central America in such quantities as to be the cheapest fruit and perhaps the cheapest food in the markets of America. The most recent addition to the list of tropical fruits is the shad-

dock, commonly called grapefruit, in which Florida at first had almost a monopoly, but is now suffering from the competition of Porto Rico.



FIG. 153.—Harvesting sugar cane, Louisiana.

Cane Sugar.—Once a rare luxury, sugar has become a common necessity of civilized life. Until about a century ago, the only commercial source was the sugar cane, a tall grass resembling corn and growing in all moist, tropical lowlands. Its great rival, the sugar beet, is a newcomer among the resources of the temperate zone and will be discussed later (p. 323). Sugar cane lands occur in all countries between the parallels of 30° north and south latitude, but the largest producers are India, Java, Cuba, and Hawaii. On account of limitations of climate and soil the only important cane sugar territory in the United States is in Louisiana and Texas. Even there the cane must be replanted every year, while in the West Indies ten or twenty crops can be cut from one planting. The sugar plantations are all on the flood plain within a few miles of the Mississippi and Red rivers or some of their numerous bayous.

The canes are planted in furrows, stalks sprout up from every joint, and after eight months' growth are ready for cutting. The labor is heavy and can be done only by strong men. The crop of 15 or 20 tons to the acre is hauled to the mill by wagons (Fig. 153), or on large plantations by movable railways. The cane is crushed between steel rollers and the juice is evaporated in a series of steam heated tanks and pans until the sugar crystallizes.

Sugar growing requires large capital. The machinery of the mill is costly and at least 1000 acres of cane are necessary to run it profitably. The home product of about 300,000 tons is less than one tenth of the quantity imported from Cuba, Java, Hawaii, and Porto Rico. The raw or brown sugar produced at the mills is sent to refineries at New York, Philadelphia, Boston, Baltimore, New Orleans, and San Francisco, where it is dissolved in hot water, filtered, purified, and evaporated to make granulated and loaf sugar. The consumption of sugar in the United States equals about 90 pounds a year for each person.

Tobacco. — The tobacco of Virginia and Maryland was the first and for a long time the most valuable article of foreign com-

merce produced by the American colonies. Although it is now grown in patches in every state from Louisiana to Wisconsin and Massachusetts, the bulk of the crop is concentrated in the transition belt between the northern and southern regions (Fig. 154). The leading states vary in rank in different years, but the usual order is



FIG. 154. — Distribution of tobacco in the United States.

Kentucky, North Carolina, Virginia (Fig. 155). The Middle West produces nearly half the quantity but only about 35 per cent of the value. The Eastern States produce about one fourth

and the Southern States one third. The value per pound and per acre is highest in Connecticut.

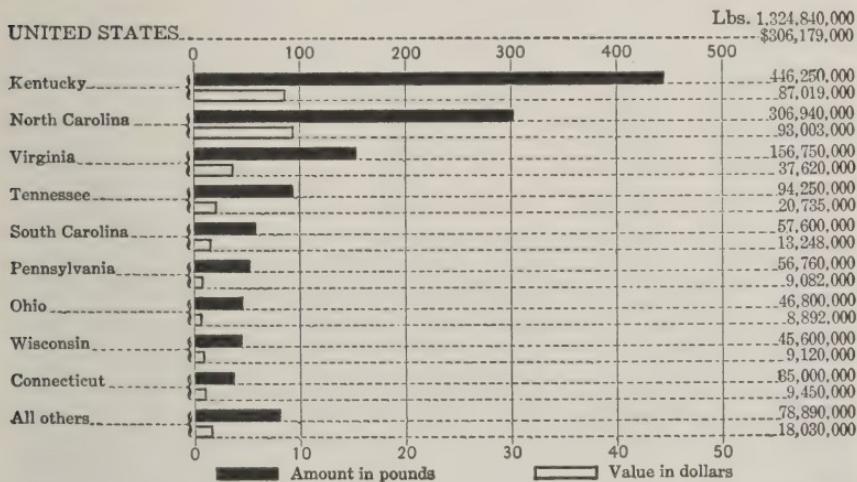


FIG. 155.—Production of tobacco (1922), by states, in millions of pounds, and millions of dollars.

Tobacco for market is profitable under the same conditions that are best for corn. The minute seeds are sown in sprouting beds and transplanted to the field. Thorough cultivation and constant care in removing worms which eat the leaves and stem are necessary. Before frost comes the stalks with the leaves attached are cut and hung in open sheds to dry. After removal of the stems the leaves are packed in bundles and subjected to a curing or sweating process which has much to do with determining their flavor and value. The plant is very sensitive to conditions of climate and soil while growing, and of heat and moisture in curing. Tobacco is very exhausting to the soil and requires heavy fertilization. In tending, harvesting, curing, and packing much hand labor adds to the expense of the crop, but a yield of 1000 pounds to the acre may be worth ten times as much as an acre of corn or cotton. The Connecticut valley is famous for the production of the thin leaves required for cigar wrappers. The field is sometimes covered with cotton cloth to protect the plants from the sun and insects, and to regulate temperature and humidity (Fig. 156).

The United States produces about 1000 million pounds of tobacco, which is nearly 50 per cent of the world's crop.

Louisville, Ky., Richmond and Petersburg, Va., and Durham and Winston-Salem, N.C., are great markets and centers of manu-



FIG. 156. — Tobacco growing under cloth.

facture. Nearly half the home crop is exported, and the imports from Cuba, Sumatra, and the Philippines amount to one tenth as much. Factories for making Havana cigars from Cuban tobacco have been established at Key West and Tampa, Fla.

The use of tobacco is almost coextensive with the human race and is rapidly increasing. The plant has a very wide range and grows in all countries between 30° S. and 45° N. India, Russia, and the East Indies rank next in production after the United States.

Live Stock. — The Southern States rank next to the Middle West in the raising of cattle and swine, and might increase that industry to advantage (Fig. 157). Their fodder resources include corn, cottonseed meal and cake, peanuts, and cassava, a root recently introduced from South America. Increased food production, both vegetable and animal, would be a means of salvation from the ruinous effects upon the soil of the long-continued one-crop system of cotton growing. The land and climate are adapted to a diversified agriculture, which would in the end in-

crease the production of cotton itself and bring greater intelligence and prosperity to the people. A noticeable feature in the



FIG. 157. — Part of a herd of 100,000 cattle, Oklahoma.

Southern States is the extent to which mules, on account of their endurance of heat, take the place of horses. Three fourths of all the mules in the United States live south of the 39th parallel and

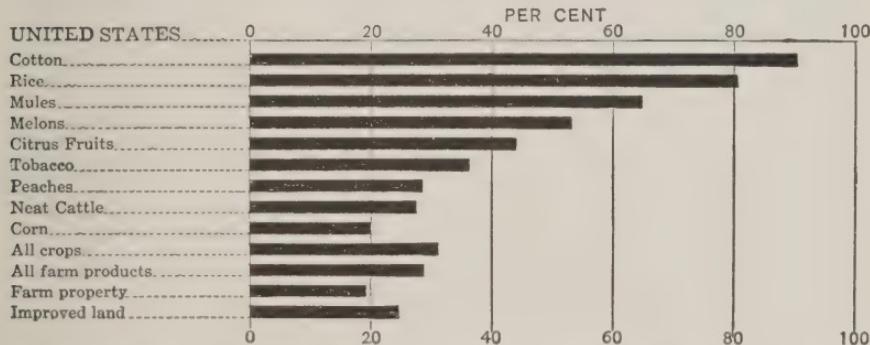


FIG. 158. — Rank of Southern States in farms and farm products. (Table III, Appendix.)

two thirds of them south of the 37th. Texas raises more beef cattle than any other state in the Union, partly on the ranges in

the arid western plateaus and partly in the corn lands of the east.

Summary. — The agricultural resources of the Southern States are second only to those of the Middle West. (See Fig. 158.) The large cotton crop may be increased, and corn, cattle, fruit, and garden truck, equal to the cotton in value, may be produced.

QUESTIONS

1. How is the field culture of cotton, now prevalent, a higher type of economy than the former plantation culture?
2. Which is of more value to mankind, cotton or corn? rice or wheat? sugar or tobacco?
3. What is the effect of a one-crop system of agriculture on the soil?
4. Under a one-crop system what is the effect of crop failure due to a bad season or to insect pests?
5. How does a great European war affect the people of the Southern States? of the Eastern States?
6. Why do not the people of the Southern States use rice so extensively as the people of other warm temperate countries?
7. Why are strawberries plentiful in the markets of the northern states from May to July?
8. How does the place held by bananas in the economy of the United States differ from that in the South Sea Islands (p. 20)?
9. Is sugar a healthful food or an injurious luxury?
10. Is the extensive and increasing use of tobacco helpful or harmful to the people of the United States?

CHAPTER XXIII

THE SOUTHERN STATES: MINERALS, FORESTS, MANUFACTURES, COMMERCE, AND CITIES

Minerals. — The Southern States possess less wealth in mineral resources than the other regions of the United States. Coal and metallic ores usually occur in rocks much older than those of the Coastal Plain. There are oil wells and mines of salt and sulphur in Louisiana, and Florida is the principal source of phosphate rock, from which fertilizer is made (p. 76). The remarkable petroleum fields of Texas are very rich but small (Fig. 159).



FIG. 159. — Derricks of oil wells, Texas.

Productive wells occur on the surface of low, gently sloping mounds, which represent bulges in the older rocks underlying the coastal sediments. The development of the oil fields of Oklahoma has recently placed that state at the head of the Southern States in total value of mineral products and of the United States in petroleum production. The mineral field of the Appalachian Highland extends into the region, and at its southern end in Alabama, coal, iron ore, and limestone occur together, making it possible to manufacture pig iron at Birmingham at less cost than anywhere else in the world. The ore is not of the best quality,

and the iron is not used for making Bessemer steel. Coal is mined outside the Coastal Plain in other states, but the quantity in all does not equal that in Alabama. Tennessee is notable for copper mines, and rivals Vermont in quarrying ornamental marbles. The Southern States produce 48 per cent of the petroleum, 7 per cent of the pig iron, and 21 per cent of the total mineral wealth of the United States.

Lumber. — The southern coniferous forest originally covered nearly the whole of the Coastal Plain and portions of the uplands. It consists mainly of yellow pine on the dry land and cypress in the swamps. Besides these, deciduous and evergreen

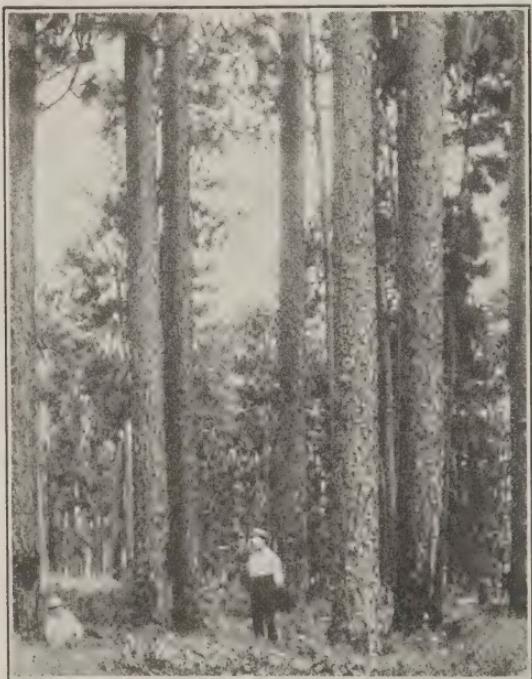


FIG. 160. — Southern pine forest, Georgia.

oaks, gums, cedars, junipers, and magnolias are prominent. The wood of the long-leaf, southern or Georgia pine (Fig. 160) has little resemblance to that of the white pine (p. 140) but is scarcely less valuable. It is hard, durable, golden yellow in color, varied in pattern of grain, and capable of high polish. Its hardness and beauty make it very desirable for floors and the inside finish of houses. Cypress (Fig. 161) is excellent for posts, siding, and shingles and has taken the place of white pine for general purposes. The uplands of Georgia, Alabama, Kentucky, Tennessee, and Arkansas are the largest

remaining sources of hardwood timber (Fig. 61). The Southern States furnish nearly half the lumber used in the United States (Fig. 163).

Naval Stores. — The distillation of tar and turpentine from pine wood is a peculiar industry of the Coastal Plain forest. Crude turpentine is a gum which exudes from cuts made in the pitch pine. When this is heated, the vapors given off condense into spirits of turpentine, extensively used in paints and varnishes. The solid which remains is common rosin. Pitch and tar are distilled from the trunk and limbs of pine trees. These articles are used on board ships for calking seams and coating ropes, and hence are called naval stores.

Manufacture. — The difficulty of securing a constant supply of workmen in a warm country is unfavorable to manufacturing on a large scale. A factory requires a full force of operatives to be on hand every working day in the year, and as few changes among them as possible. In tropical and subtropical countries the people are not commonly accustomed to work regularly and steadily, because their modes and standards of living do not require it. Clothing is light, and housing inexpensive. A



FIG. 161. — Cypress forest, Mississippi.

little rude cultivation of the soil suffices to produce food. There are months in the year when human beings can revert to the practice of collective economy and live off the country, enjoying in idleness what it spontaneously produces, with little forethought and less effort than the birds and beasts make. These conditions exist to some degree in the Southern States.

During the existence of slavery, the negroes were fit only for agricultural and domestic service. The landholders found it very profitable to raise cotton and sell it all to English and Yankee manufacturers. After the abolition of slavery, labor conditions were for many years worse than before. The white planters had no capital, and the negroes, no longer subject to control and thrown upon their own responsibility, wandered about helpless and bewildered. There had come to be a large class of "poor whites," people who did not own land and were hardly more competent than the blacks. They lived in poverty and ignorance and were generally regarded as lazy and shiftless. These characteristics are now known to be due in large measure to the prevalence of hookworm disease, which was universal among them. The worms enter the body through the feet and, becoming established in the digestive organs, produce serious disturbance and debility



FIG. 162. — Water power and cotton mill, Columbus, Georgia.

of the whole system. They can be easily got rid of by the use of medicine, and kept out by wearing shoes instead of going barefoot. These white people have been found available for work in cotton mills and furnish a supply of cheap labor scarcely equaled elsewhere. This is partly due to their large families and the employment of children in the mills. It is not unusual for parents to live upon the earnings of their children of all ages from twelve years up.

Since 1880 cotton mills have been built along the Fall Line and near the foot of the mountains where water power is abundant (Fig. 162). North Carolina, South Carolina, Georgia, and Alabama now produce cotton goods amounting to one third the value of the total for the United States. They use more raw cotton than New England, but the cloths made are coarser and are largely exported to China and tropical America.

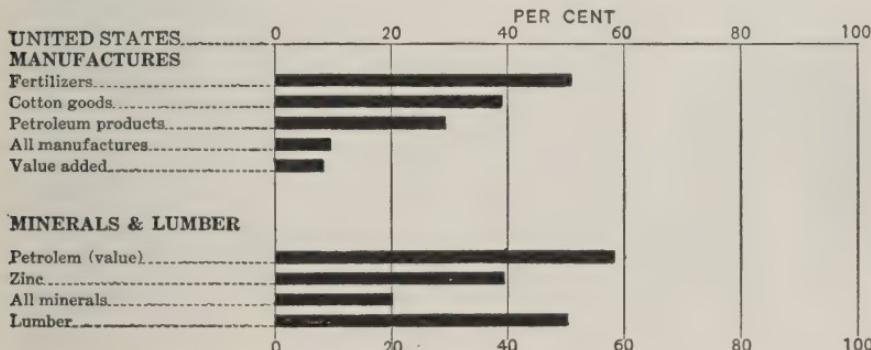


FIG. 163.—Rank of Southern States in manufactures (see Table V, Appendix); and in mineral and forest products (see Table VI, Appendix).

The total value of manufactures in the Southern States is nearly one tenth that of the United States. (See Fig. 163.)

Waterways.—The waterways of the Southern States are utilized more extensively than in any other region of the United States. This is due to the parallel drainage peculiar to the Coastal Plain. Outside the Mississippi system, there are 16 rivers navigable for 100 miles or more and leading directly to the sea. Each forms a convenient outlet for its own narrow drainage basin, having an inland town at the head of navigation

and a seaport at its mouth. Each basin is commercially isolated from its neighbors, and the result is a large number of small towns and ports and no great centers.

The lower Mississippi is capable of very large development as a waterway (p. 159). At present it carries little through traffic, mostly in coal from Pennsylvania and West Virginia, and lumber from Minnesota and Wisconsin. The Federal Government has spent many millions of dollars for the improvement of navigation. The principal works consist in protecting the banks from wash, the removal of bars, the closing of side channels, and the construction of levees calculated to confine the waters, to quicken the current, and to deepen the channel. A depth of nine feet is maintained from St. Louis to New Orleans, but this is not sufficient to enable the river to compete with the railroads as a route for traffic. A waterway at least fourteen feet deep from Chicago to New Orleans is greatly needed, but the expense of construction and maintenance would be enormous. The new demands created by the opening of the Panama Canal may justify the necessary outlay (p. 160).

The Tennessee River has been improved by the Federal Government and is navigable to Knoxville, about 500 miles. The Arkansas and Red rivers, and numerous smaller tributaries and distributaries of the Mississippi are used for the shipment of cotton, sugar, rice, and lumber from the plantations and forests to New Orleans.

Railroads. — The main trunk lines of the Southern States extend north and south, connecting the northern cities with the seaports (Fig. 147). The most extensive system is the Southern Railway, the lines of which reach nearly every important town from Chesapeake Bay to Florida and from the Atlantic coast to the Mississippi. The Illinois Central parallels the Mississippi from Chicago and St. Louis to New Orleans, touching the river towns, and has been a potent agent in destroying the through river traffic. The Louisville and Nashville connects St. Louis and Cincinnati with Memphis, Atlanta, Pensacola, Mobile, and

New Orleans. The Atlantic Coast Line and Seaboard Air Line furnish direct routes from Chesapeake Bay, through the principal towns of the Coastal Plain and Piedmont Plateau, to southwestern Florida. The Florida East Coast Railway passes through the numerous seaside resorts from Jacksonville to the southern end of the peninsula, and is continued 100 miles along the chain of "Keys," or small islands to Key West, where it connects with steamers for Havana. It crosses the shallow straits between the



FIG. 164.—Concrete arches of "the oversea railroad," Florida.

Keys on concrete viaducts (Fig. 164) aggregating about 40 miles in length and has thus earned the name of "the oversea railroad."

West of the Mississippi, the Missouri, Kansas, and Texas system extends from St. Louis and Kansas City through Oklahoma and eastern Texas to Galveston. The Missouri Pacific and allied lines connect St. Louis through Arkansas with Laredo and El Paso on the Mexican boundary. The most important east-west line is the Southern Pacific, which runs from New Orleans, near the southern boundary of the United States to the Pacific coast. The railway mileage of the Southern States is one fourth of the total for the United States. The density of mileage is three fourths that of the Middle West and half that of the Eastern States.

Foreign Commerce. — The total foreign commerce of the Southern States is only one fourth as much as that of the Eastern States, but their exports amount to nearly one half as much, being nearly five times the imports. This is due to the large place held by cotton, which once formed more than half the total value of the exports of the United States and is still the largest item. More than half the crop is exported, having a value of \$807,102,000,000.

Cities. — The agricultural character of the Southern States, the relatively small development of manufactures, and the number of seaports (p. 274) are conditions unfavorable to the growth of

large cities. The number having 10,000 inhabitants or more in 1920 is 115, of which only nine have more than 100,000. Of cities of more than 25,000 Texas has ten, and the other states two to five each, except Mississippi, which has none.

New Orleans.

— The metropolis of the South holds a unique position among American



FIG. 165.—New Orleans and vicinity.

cities. It is a river port near the mouth of one of the largest rivers in the world, and the principal seaport on "the American Mediterranean."



FIG. 166. — Loading cotton on the levee at New Orleans.

Site and Plan. — New Orleans is a delta city located in a wide bend of the Mississippi 100 miles above its mouth (Fig. 165). The ground is almost level alluvial plain, only ten feet above the sea and as many below the top of the levee which protects it at high water. The river front of about nine miles curves around three sides and gives it the name of "the Crescent City." The river which serves as a harbor (Fig. 166) is about half a mile wide and from 40 to 200 feet deep. The city with its suburbs extends back from the river to the shore of Lake Pontchartrain, a large arm of the sea, too shallow for navigation. The general plan is well adapted to the site with one set of streets curving parallel with the river and another set extending at right angles to it. The old city, now called the French or Latin Quarter, occupies the northeastern part of the area, and the new city, or American Quarter, the southwestern.

Public Works. — The low and level surface of the site, some of which is below sea level, renders the problem of drainage difficult. Until the present century there were no sewers, paved streets, or public water supply. Rain water stored in cisterns above ground and open surface gutters in place of sewers made the city notoriously unhealthy. It was visited by frequent epidemics of cholera and yellow fever, and its death rate was the highest of all the large cities of the United States. There are now more than 300 miles of sewers, which carry the drainage to stations where it is pumped into the river below the city. Cisterns have been abolished and a supply of good water is obtained from the river above the city. These measures have reduced the death rate more than one half. The cemeteries are a notable feature. On account of lack of drainage, burial is almost impossible and the dead are placed in tombs of brick or stone built entirely above ground. The French Quarter contains many buildings and monuments of historic interest. The city is the seat of Tulane University, one of the strongest in the South.

Commerce. — The great possibilities of New Orleans as a commercial center were an important consideration which led to the purchase from France by the United States of the Louisiana Territory in 1803. The opening of the Erie and other canals and the extension of railroads across the northern Appalachians diverted trade to the north Atlantic ports. In spite of that, steamboat navigation on the Mississippi developed to large proportions and became an important factor in the settlement of the Middle West. During that period New Orleans was the chief commercial center and the most rapidly growing city west of the Appalachians.

During the Civil War the Mississippi was closed and all traffic cut off. The bars at the mouth of the river, the unsanitary conditions of the city, and the lack of enterprise among its citizens prevented recovery of the lost commerce for 25 years. The river trade with the Middle West has never revived, but is now far surpassed by the movement by rail. Between 1875 and 1880 Captain Eads secured a deep channel to the ocean through the South Pass (Fig. 165). This was done by the construction of jetties, or embankments which narrow the channel and quicken the current, thus causing it to scour out its bed (Fig. 167). In 1909 the Federal Government

completed a system of jetties at the Southwest Pass, opening a still deeper channel.

New Orleans is now accessible by the largest ocean steamers, of which there are many lines running to the West Indies, Central America, New York, and Europe. The city is fortunate in controlling enlarged and improved docks and terminals to which



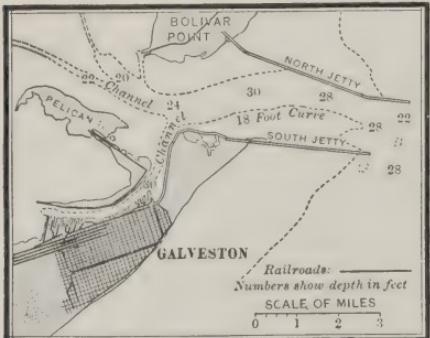
FIG. 167.—Jetties at the mouth of the Mississippi River.

goods are brought by eleven railways. A ship canal now connects the river with an inner harbor and Lake Pontchartrain, and will be extended to the Gulf. The largest export is cotton. Coffee from Brazil and bananas from Central America are the chief imports. The foreign trade amounts to \$473,000,000, ranking third among our seaports. Perhaps more than any other seaport, New Orleans is in a position to profit by the opening of the Panama Canal, which may compel the improvement of the lower Mississippi, turn the currents of trade from the east to the south, and restore to the city its former importance as an outlet for the products of the Mississippi basin.

Population. — In New Orleans the native white population of native parentage is only 50 per cent, but the addition of the 26 per cent of colored people renders the proportion of native Americans very large. Among the foreign population Italians are most numerous. The original settlers were of French and Spanish blood and speech, and their descendants, called Creoles, still maintain a language of their own and have impressed their manners and customs upon the whole city. To their influence is due the famous displays and festivities which mark the carnival season and attract many visitors.

Galveston. — A small city on a sand bar at the mouth of a shallow bay (Fig. 168), Galveston is a remarkable example of the

creation of a seaport almost without a harbor. The demand for shipments by sea from the country behind the long stretch of Texas coast was so great that large vessels anchored several miles off shore and transferred cargoes in lighters, or small boats. The Federal Government has built jetties about 20 miles long and now maintains a



The map illustrates the artificial creation of a port at Galveston. It shows two main jetties extending from the city: the North Jetty to the north and the South Jetty to the south. Between them is an 18-foot curve. Various channels are marked with numbers indicating water depth in feet, such as 20, 24, 30, 28, 22, 24, 26, 28, 30, 31, and 32. A legend indicates that numbers show depth in feet. A scale bar shows a distance of 0 to 3 miles. The city of Galveston is shown with a hatched area, and Bolivar Point is labeled to the north. Pelican Island is also indicated.

Fig. 168. — Galveston.

channel 28 feet deep to the wharves. In 1900 the city, only a few feet above sea level, was destroyed by the waves, accompanying a hurricane. The demands of commerce were so great that capital was found to rebuild it on a higher grade and to protect it by a sea wall five miles long (Fig. 169).

Other Seaports. — Of the Southern States *Savannah* (83,000) has the best harbor on the Atlantic coast and ships out large quantities of lumber and naval stores. *Charleston* (68,000) has a harbor made accessible by jetties and was once a great cotton shipping port. Its trade has now declined. *Jacksonville* (92,000), the chief city, seaport, and railroad center of Florida, is also a center of attraction for winter visitors. *Mobile* (61,000)



FIG. 169.—The wall built to protect Galveston from the waves.

stands at the head of a large but shallow bay. The natural ship channel of only 8 feet has been deepened to 24 feet, and the city exports cotton and lumber, and imports tropical fruits. There are many other ports useful for the shipment of special products, but not marked by a town of any considerable size. Among these are *Wilmington*, N.C., *Brunswick*, Ga., *Pensacola*, Fla., *Gulfport*, Miss., and *Port Arthur*, Texas. (See Fig. 147.)

Inland Cities.—The Southern States are a region of small cities, each a thriving railroad and manufacturing center for its own state. Among the largest of these cities are *Atlanta*, Ga. (201,000); *Birmingham*, Ala. (178,000); *Memphis* (162,000) and *Nashville*, Tenn. (118,000); *Oklahoma City*, Okla. (91,000); *San Antonio* (161,000), *Dallas* (159,000), *Houston* (138,000), and *Fort Worth*, Texas (106,000).

Population and Economic Rank.—The mild climate, perennial rainfall, and wide extent of young plains which made the growing of cotton by slave labor profitable in the Southern States are directly responsible for their social and economic condition. A native white population of native parentage of 63 per cent and a rural population of 82 per cent are unequalled in any other region

of the United States (Fig. 37). Thirty per cent of the people are negroes, and in the "black belt," extending from South Carolina to Mississippi, they outnumber the whites. Their presence has kept the foreign population down to 2 per cent and made the Southern States the most purely American community in the country. At the same time industry has been hampered and the region has been kept in the second class of complex societies (p. 92) which export raw materials and import manufactured products.

Summary. — The natural resources of the Southern States are ample to supply a society of the highest class. On account of their tropical products they might be more self-sufficing and independent than the Northern States. A continued influx of capital from the north is bringing about an extension of the industries which coal fields and water power make possible. This, combined with more varied agriculture, will in the future raise their economic rank and efficiency.

QUESTIONS

1. What public good can be accomplished by the creation of a National Forest Reserve in the southern Appalachians?
2. How did slave labor affect manufactures?
3. Why are manufactures in the Southern States chiefly of cotton?
4. Why are warm countries generally unfavorable to the existence of large factories?
5. Why have extensive systems of hydroelectric power transmission been constructed in the southern Appalachian Highland?
6. In what waterways are the Southern States interested in common with the Middle West?
7. Find on the map, Fig. 147, five pairs of cities, one of each being a seaport, the other a river town, and both on the same river.
8. Why is navigation on the lower Mississippi difficult?
9. What other seaports in the world stand, like New Orleans, near the mouth of a large river?
10. In 1915 Galveston was again partly destroyed by a hurricane. Is a sea port at Houston, 50 miles inland, practicable and preferable to one at Galveston?

CHAPTER XXIV

THE INTERIOR STATES

THE Interior States constitute a region in which the natural and economic conditions are strongly contrasted with those of the rest of the country. The land is high and, except on the mountains, treeless. The vegetation varies from steppe to absolute desert, and agriculture without irrigation is generally impossible. Fuel resources are scanty. Many of the streams and lakes dwindle or go dry a part of the year and their waters fail to reach the sea. There is no seacoast, no waterway, and no port upon lake or river. The region is saved from extreme poverty by the Rocky Mountain system, which occupies three eighths of its area. These mountains are so lofty that they condense sufficient rainfall to support forests and to feed great rivers, which flow from them across the arid plateaus and furnish water for irrigation and power. The disturbance of the earth crust during the upheaval of the mountains caused many cracks and fissures, which have been filled with ores of many metals. The wearing away of the mountains by frost and streams has left the veins of ore within reach. The principal resources are copper, gold, silver, lead, zinc, bunch grass, timber, and water power, and the chief occupations are mining and herding.

The natural region to which the foregoing statements apply is bounded on the east by the rainfall line of 20 inches and on the west by the crest of the Cascade, Sierra Nevada, and San Bernardino mountains. It extends northward into Canada and southward into Mexico. It includes more than 40 per cent of the area of the United States, and has a population less than that

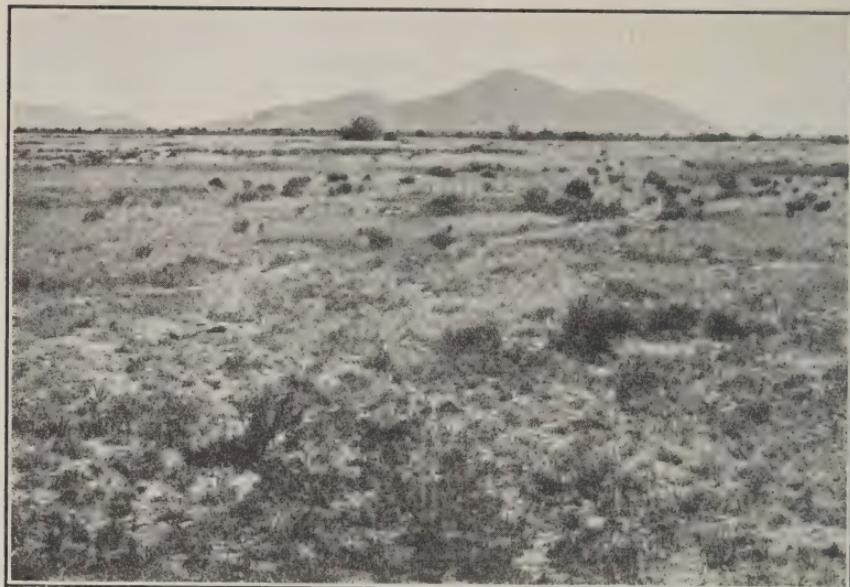


FIG. 170.—Desert before irrigation, near Phœnix, Arizona.

of Massachusetts. Eight states lie wholly within it, Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona (Figs. 170, 171), Utah, and Nevada.¹ Their area is 29 per cent of the United States, and their population, about 3 per cent, nearly equals that of Michigan or Missouri. The density is three persons to the square mile. (See Figs. 29, 34, 35, 36, 172.)

Relief.—The relief features and regions of the Interior States are more complex than those of the Atlantic division of the United States (Fig. 33). As a whole, the region may be thought of as a plateau, from a half mile to a mile high and nearly 1000 miles across, having a belt of mountains from 100 to 400 miles wide extending through it. The mountain belt is widest in the north, highest in the middle, and narrowest and lowest in the south. East of the mountains the plateau slopes gently to the plains of the Middle West, more abruptly to those of the Southern States. West of the mountains, the plateau is divided into

¹ These are the Mountain States of the Census Bureau.



FIG. 171.—Field of barley on irrigated desert, near Phoenix, Arizona.

several basins with a high mountain rim on the west and a rather wide gap at the southwest corner.

The Great Plains, more appropriately called the High Plains, rise from the 2000-foot contour line to a height of 4000 to 6000 feet at the foot of the Rocky Mountains. Over most of the area they appear to be as level and boundless as the sea, but are broken in some localities by dome-shaped elevations, monumental buttes, lines of cliff, narrow canyons, and intricately dissected areas of "bad lands." The most prominent feature is the Black Hills in South Dakota, an eroded dome of oval outline, 50 by 100 miles in diameter, rising about 3000 feet above the plains, like an island from the ocean. Their elevation produces a good rainfall and as a result they are well forested. The extreme northern part of the plains is covered with glacial drift.

The Rocky Mountains.—This system is so extensive and complex that a detailed description would fill a volume.



Fig. 172.
INTERIOR AND
PACIFIC STATES

The Northern Rockies occupy western Montana, northwestern Wyoming, and most of Idaho. There are scores of ranges with intervening valleys having a general northwest and southeast trend. The Bitter Root range on the Idaho-Montana boundary forms the backbone ending in the famous Yellowstone National Park. In southern Wyoming there is a gap in the system about 100 miles wide through which the old emigrant trail and the Union Pacific Railroad pass. *The Central Rockies* consist of three parallel north-south ranges in central Colorado and a massive knot in the southwestern part of that state. There are about 100 peaks more than 13,000 feet high, of which Pikes Peak (14,108) is one of the highest. *The Southern Rockies* traverse central New Mexico and extend through Texas into Mexico. The *Wasatch* and *Uinta* mountains in Utah form a system distinct from the main Rockies, and face the west with a very steep slope.

The Intermont Plateaus. — The space between the Rocky Mountains and the Pacific ranges is divided into three plateaus.

The Columbia Plateau in Idaho and southeastern Oregon is a smooth plain formed by a sheet of lava thousands of feet thick, which flowed in a liquid state from cracks in the earth and spread out like water. The Snake River has cut a great canyon through it, but there are few surface streams. Western Utah, Nevada, southwestern Arizona, and southeastern California lie in the *Great Basin*, which is nearly surrounded by mountains and on account of small rainfall has no overflow to the sea. The surface is ridged with scores of short, parallel mountain ranges. Between the Rocky and the Wasatch mountains, in Colorado, Utah, New Mexico, and Arizona, the *Colorado Plateau* presents a series of escarpments (high cliffs), rising by gigantic steps like a staircase to flat-topped mesas (tables), which are cut into blocks by profound canyons, all on the largest scale. The structure could be imitated by piling up children's building blocks.

Climate. — The economic character of the Interior States is determined even more by the climate than by the large features of relief. Their position in the interior of the continent brings extreme temperatures. The coldest winters in temperate North America occur in Montana and the hottest summers in Arizona. On account of elevation the differences between day and night are large. Of more importance than elevation and distance from the sea is the mountain barrier along the western border which

stops most of the moisture brought by the westerly winds from the Pacific. As these winds pass eastward nearly all the remaining moisture is condensed by the Rocky Mountains but the Great Plains receive some rainfall brought by cyclonic storms from the Gulf of Mexico. The annual rainfall on the eastern and northern plateaus is between 15 and 20 inches, but in most of the heated depression of the Great Basin it is less than 5 inches; the belts of high mountains receive 20 to 30 inches.

Drainage. — The distribution of rainfall determines the peculiar character of the drainage. On the Atlantic side, the Missouri and Arkansas rivers and their branches flow from the Northern and Central Rockies as full, strong streams, subject to great floods from the melting snows of spring. In crossing the arid plains they lose in summer more water by evaporation than they gain by rainfall. As their volume decreases, they deposit a large part of their load of sediment and shift about in crooked and divided channels through broad, shallow, waste-filled valleys. Hence they are of little or no use for navigation. The Rio Grande flows southward parallel with the Southern Rockies, cuts through them on the southwestern border of Texas and escapes to the Coastal Plain and Gulf. It is more variable in volume and channel than the northern rivers.

On the Pacific side in the north, the Columbia and the Snake flow from the mountains across the lava plateau through deep canyons and cut through the Cascade Range to the ocean. From the Central Rockies and the Wasatch, the Green and Grand rivers unite to form the Colorado. These rivers and all their tributaries are sunk far below the surface of the plateau in the deepest and most extensive system of canyons in the world.

The Grand Canyon in northern Arizona is more than 200 miles long, with walls which rise precipitously on either side a mile above the water. On account of rapids, navigation in the Colorado is impossible and irrigation is possible only after its escape from the canyons into the lowland near its mouth. It flows through Mexican territory into the Gulf of California,

which like the Red Sea is a long, narrow arm of the ocean surrounded by deserts.

The streams of the Great Basin are small and flow into salt lakes or sinks which frequently dry up. Many of them are temporary, carrying water only after a storm, and end in the sands of the waste-filled valleys.

Vegetation. — The mountains and plateaus between the heights of 6000 and 10,000 feet generally receive 20 inches or more of rainfall and are covered with coniferous forest (Fig. 61).

The plateaus which receive between 10 and 20 inches of rain are treeless steppes on which the characteristic vegetation is bunch grass. Here in summer two or three species of grass grow in bunches with more or less bare ground between. In autumn the grass dies and cures upon the ground, furnishing all the year round an amount of very nutritious fodder



FIG. 173. — Sage brush land capable of irrigation, Oregon.

strictly proportional to the rainfall of the growing season. The areas with less than 10 inches of rain may be classed as desert, producing a scanty growth of scattered, thorny, thick-skinned, and almost leafless plants, adapted to dry soil and dry air, of which the sage brush and cactus are striking examples (Fig. 173).

Summary. — Elevation above the sea, mountain ranges, and position in the interior of the continent render the Interior States

generally too dry, too cold, or too rough for agriculture. Mining and herding are conspicuous economies.

QUESTIONS

1. How does the Sierra Nevada-Cascade system affect the economic value of the Interior States? How does the Rocky Mountain system affect it?
2. Why are the rivers of the Interior States of little use for navigation?
3. Why is the population of the Interior States so sparse? (Fig. 34.)

CHAPTER XXV

THE INTERIOR STATES: HERDING AND AGRICULTURE

IN the Interior States the most general, permanent resource is bunch grass and the most common occupation is grazing cattle and sheep. As a rule, the ground is too dry to support trees or the grasses which form a dense, continuous sward, and farming by ordinary methods is a failure. Lands having a rainfall between 15 and 20 inches are called semiarid, and where the evaporation is relatively small, as in the north, farming by special methods may prove permanently successful.

Cattle ; The Free Range.—The possible resources of the Great Plains were indicated to the first white men who visited them by the enormous herds of “humpbacked cattle,” or buffaloes, they saw there. They were among the largest of the cattle family, the males sometimes weighing a ton and standing nearly six feet high. No accurate count was ever made, but their numbers were millions. A single herd sometimes formed a nearly solid column 25 miles wide.

About the middle of the last century the buffaloes began to be displaced by cattle descended from those brought by the Spaniards to Mexico. The land belonged to the Federal Government and was unoccupied except by hostile Indians, hunters, trappers, and an occasional military post. Herds of long-horned, half wild cattle were driven northward to feed upon the rich pastures of the “free range.” The “long trail” stretched its main lines from Texas to Montana, with branches covering the territory between the Missouri and the Rocky Mountains. The cowboys in charge of the herd had no home except the camp by night and the saddle by day, and became perhaps the most skillful horsemen in the world. Every animal was marked with the special brand of its owner. The branding was done at a spring “round-up” where all the cattle from a wide territory were got together, and each calf was marked with the brand of its mother. At another round-up

in the autumn the cattle belonging to the different owners were separated and the best of each herd were sorted out to be driven to market.

Ranching. — The extension of the Union Pacific Railroad across the plains between 1865 and 1869 was the beginning of great changes in the cattle business. The Indians, who had been the cowboys' worst enemies, were brought under control. Towns where thousands of cattle were shipped eastward by rail sprang up like magic. While cattle raising was thus stimulated, the railroad also brought permanent settlers who bought land, and the free range began to be broken up. Railroad extension and the settlement of the country have gone on until cattle are now kept upon ranches, in some cases of immense size, but the land is owned or leased by the occupants and fenced with barbed wire. The cowboys live in substantial ranch houses, from which they are seldom absent more than a few days at a time. One cowboy can usually look after 1000 head ranging over a territory as large as an ordinary township of 36 square miles. Wells and windmills supply water, hay is made, and shelter is provided for the cattle. Thus losses once common from starvation and exposure during severe storms are avoided.

Forage. — The productivity of arid lands has been greatly increased by the introduction of new forage plants which flourish in spite of small rainfall. Of these the most important is alfalfa, a rich and vigorous clover, which sends its roots to great depths. The valleys of the cattle country can usually be irrigated and made to yield from three to five cuttings a year, the hay from which is almost as fattening as corn.

The ranchman knows how many head he can send to market each year, and the business has lost most of its adventurous character. Few milch cows are kept, and butter and cheese are often imported for use on the ranch. The aim is to produce beef cattle as rapidly as possible. Cattle are pastured on the ranch about two years and then sold to farmers in the Middle West, Southern States, and even as far east as Pennsylvania to be fattened on corn or cotton seed before slaughtering. The chief centers for slaughtering

and meat packing are Chicago, Kansas City, New York, Omaha, Indianapolis, and St. Louis (Chap. XII).

The leading cattle states of the Interior are Colorado, Montana, New Mexico, and Arizona. While cattle raising is an important industry of the Interior States, the whole number of beef cattle kept is only about 17 per cent of the total number in the United States, and is approached by those in the state of Texas alone. The most favorable conditions for beef production are found in the border states, which combine grazing with a large corn crop. Of these, Texas, Iowa, Kansas, Nebraska, and Oklahoma lead all others.

Sheep. — The Interior States rank higher in the number of sheep raised than in cattle, the total amounting to 44 per cent of the number in the whole United States. Sheep thrive on thinner and coarser pasturage than cattle, and there are still large areas of unsold and unoccupied land belonging to the Federal Government, where sheep grazing is permitted under suitable regulations. (See Fig. 174.)



FIG. 174. — Distribution of sheep in the United States.

Wool and Mutton.—Sheep are raised for both wool and flesh, but the best wool and the best mutton cannot be produced by the same animal. The Spanish Merino sheep is little more than a bag of bones, covered with a wrinkled skin, upon which grows a dense fleece of fine wool sometimes amounting to one third of the total weight of the animal (Fig. 175). On the other hand, the plump carcass of the English Southdown sheep, covered with light, coarse wool, furnishes 200 pounds of delicious mutton. Therefore, the sheep grower must adapt his breed to his resources and market. In rough, arid, and sparsely settled regions, limited pasturage, lack of grain, and distance from market tend to make mutton unprofitable, while wool can be easily grown and shipped to any distance (p. 217). In rich agricultural regions near large cities mutton yields a larger return than wool.

In the west, sheep were at first bred entirely for wool. The use of cold storage and refrigerator cars (p. 144) has enlarged the market for mutton and the sheep herders have found it increasingly profitable to breed animals for flesh. As in the case of cattle, the lack of grain for fattening is to some extent overcome by selling full-grown animals to the farmers of the Middle West and Eastern States, where they are kept in small flocks. Better feed and care result in more rapid increase, and the annual flock of lambs is far more valuable than the wool. (See Fig. 176.)

Agriculture.—The cattle and sheep country is being year by year encroached upon and invaded by homesteaders or "nesters," men with small capital, who do not depend wholly upon herding, but live more or less by farming. Everywhere the ranches are being broken up into farms. The story of this change and how



FIG. 175.—Merino ram.

it has come about forms a remarkable chapter in the economic history of the country.



FIG. 176.—Sheep on an Oregon ranch.

The first attempts at farming on a large scale in the semiarid country were disastrous failures. The abundant returns from the farms of eastern Kansas and Nebraska led the settlers to push westward beyond the 20-inch rainfall line. A series of years during which the rainfall was above the average led them to believe that "rain follows the plow." New counties were organized, new towns were laid out, and public buildings were erected on a large scale. A period of less than average rainfall followed, crops failed year after year, and people were compelled to move or starve. Whole towns were deserted with loss of all the capital invested. An apparently thriving agricultural region was left in the possession of its original inhabitants, the prairie dogs.

Twenty years later the same and similar lands were taken up by farmers who had learned from experience and by scientific research what can and what cannot be done in an arid climate. The methods which make success possible are chiefly three: planting crops which resist drought, dry farming, and irrigation.

Drought Plants. — The general characteristics of plants peculiar to dry regions are given on page 65. Some of them have been cultivated by desert peoples for ages and are of great value. The United States Department of Agriculture has sent out agents all over the world to look for plants which might prove useful at home. Experts have been employed to breed new varieties which might be adapted to unusual conditions.

The result of such research has been the introduction of alfalfa, Kafir corn (Fig. 177), durum wheat, and millet. Alfalfa, formerly known as lucern, originated in Asia, but was introduced into the western states from Chile. Its influence upon agriculture can hardly be overestimated. It produces more fodder per acre than any other plant, and when plowed under, it fertilizes the soil. Its cultivation has extended into the humid lands of the east, where it is taking the place of the long-established timothy and clover for meadows. Several varieties of durum or hard wheat have been brought from southeastern Russia and are resistant to cold, drought, and disease. The yield is large and their cultivation has extended into arid regions where no such crop was



FIG. 177. — A field of Kafir corn.

imagined possible. The flour contains too much gluten for bread making and is used in the form of macaroni. Kafir corn brought from South Africa produces grain, not in ears but on the loose stems of the tassel, under conditions of dryness where eared corn would hardly survive through the season. Millet and sorghum are names applied to several species of grass, the seeds of which are used in the Old World as human food. In America their drought resisting qualities have led to their cultivation for forage and fodder.

Dry Farming. — The area in which plants especially adapted to arid climates and soils can be grown with profit has been greatly extended by "dry farming." This consists essentially in retarding evaporation of water from the ground and thus storing the rainfall of two or more years to raise one crop. This is done by frequent cultivation and mulching. The amount of land and labor required is about twice as much as for the same return in humid regions.

Irrigation. — Desert soils are not generally lacking in any plant food except water. On the contrary the rainfall is insufficient to wash out salts of soda, potash, and lime which accumulate and render the soil alkaline and unfit for ordinary vegetation.

The only sure method by which agriculture can be permanently maintained on lands which lack rain is by supplying water from other sources. Most arid lands are penetrated or crossed by streams which have their sources in well-watered highlands. The typical and historic example is Egypt, almost rainless, but made rich by the Nile water from the plateaus of equatorial Africa. Natural irrigation occurs when such a stream overflows its banks and inundates its valley. As soon as the flood subsides, grain may be sown upon the mud and the crop will mature before the saturated soil is completely dried. In very early times men learned to extend the area of watered land and to prolong the benefits of the flood by artificial means. These consist of reservoirs to store up water for use during the

dry season, pumps for lifting water to higher levels, and canals and ditches for distributing water over the fields (Fig. 178).

Irrigation on a large scale is sometimes possible by very simple means. The Jordan River in Utah is fed by streams from the Wasatch Mountains, and empties into Great Salt Lake, which is surrounded by a barren plain. Ages ago, a flow of lava across the valley dammed the river and formed Utah Lake, a natural reservoir of fresh water 30 miles long. When the Mormons settled in Salt Lake valley, they had only to build an inexpensive dam in the canyon which the river had cut through the lava, and run ditches over the plain to secure an abundant harvest.

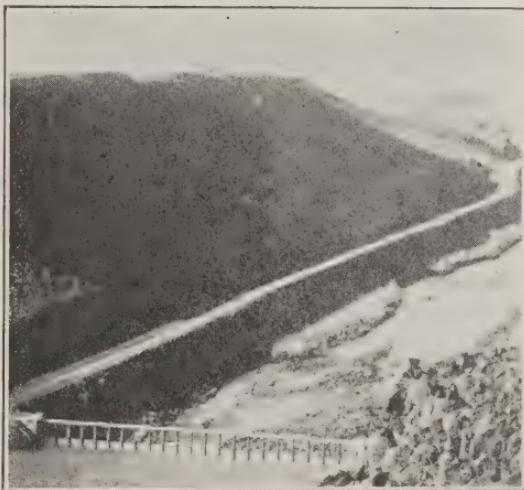


FIG. 178. — Dam, and irrigation canal leading to farms in the distance, Idaho.

Reclamation Service. — Modern irrigation works demand the exercise of the highest engineering skill and are in many cases too costly for individual or private enterprise. They are sometimes constructed by a company which sells the water to the farmers, but the most extensive projects are carried out by the Government (Figs. 179, 180). The United States Reclamation Service has been instituted for the purpose of selecting favorable sites and constructing works, the cost of which will be repaid by the sale of land, water, and power. A peculiar combination of natural features is necessary. There must be a stream of considerable and fairly constant volume, and either a natural lake or a narrow canyon which can be closed by a dam to make a reservoir. There must be extensive lowlands in the valley below, over which water may be easily distributed and from which it



FIG. 179.—Steppe before irrigation, Shoshone Project, Wyoming.



FIG. 180.—Alfalfa field on steppe after irrigation, Shoshone Project, Wyoming.

may be drained, for drainage is as necessary as supply (p. 318). These conditions are commonly found where streams flow out from the mountains upon the plains. Along the eastern side of the Northern and Central Rockies, on the tributaries of the Missouri, ten projects have been undertaken or completed, on the Rio Grande and Pecos three, on the Colorado and Gila four,

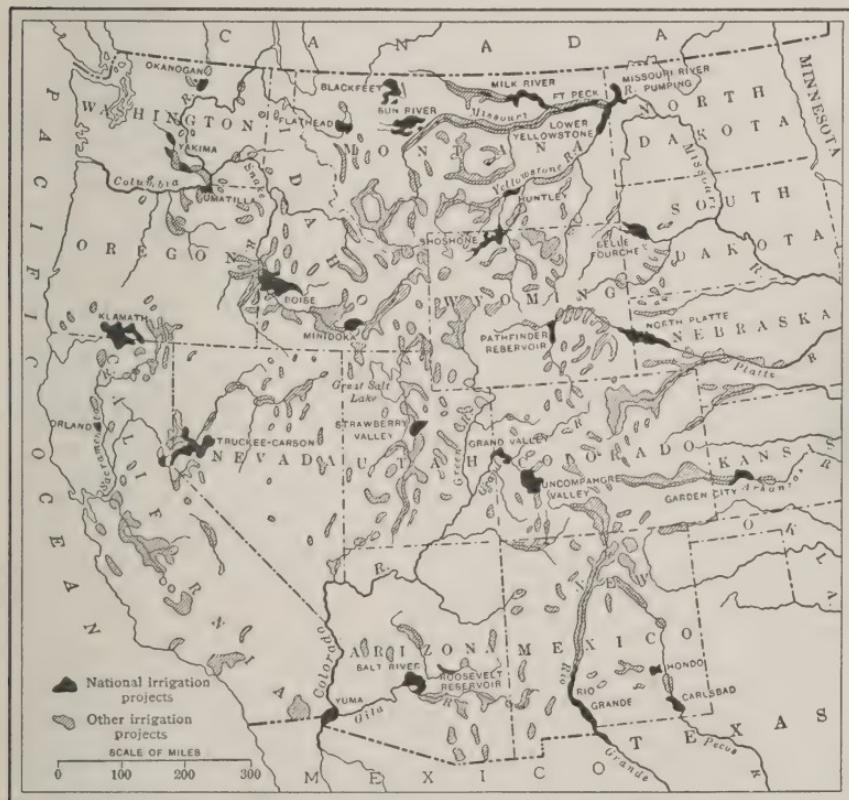


FIG. 181.—Irrigation projects in the Interior and Pacific States.

on the Columbia and Snake six, and in the Great Basin two (Fig. 181). Of these a few may be described as examples of all.

The Truckee-Carson Project.—On the Nevada-California boundary Lake Tahoe, a deep glacial lake in the Sierra Nevada, 6000 feet above the sea, con-

tains water of great purity. Its outlet, the Truckee River, has been diverted by a dam and canal which carries the water to the Carson valley to irrigate 350,000 acres of alkali desert.

The Salt River Project. — On the upper Salt River, above Phœnix, Arizona, the Roosevelt dam, 1080 feet long, and 284 feet high, forms a lake covering 25 square miles and impounding water enough to irrigate 270,000 acres in the valley below. The watershed is mountainous, largely forested, and controlled by the government. Hydroelectric power is developed in the canal for industrial purposes, and for pumping water from the irrigated ground to be used again for the same purpose.

The Yuma Project. — The lower 300 miles of the Colorado River in Arizona-California is bordered by a wide flood plain, terminating in a great delta in Mexican territory. The available water is sufficient to irrigate 1,375,000 acres. A dam at Laguna nearly a mile long and 19 feet high provides for watering 130,000 acres.

The Uncompahgre Project. — In southwestern Colorado, by an extraordinary feat of engineering, the water of the Gunnison River is turned out of an almost impassable canyon through a six-mile tunnel to irrigate 150,000 acres in the wide Uncompahgre valley.

The Arrowrock Project. — Near Boise, Id., in a tributary of the Snake River, a dam, 1100 feet long and 350 feet high, impounds water to irrigate 248,000 acres.

The area of irrigable land in the arid regions of the United States is limited by the amount of available water. It is variously estimated to be from 60 to 100 million acres, or about one tenth of the total area.

Wells. — The flow of water from the mountains is not confined to the surface, but it seeps slowly through porous strata under ground to a distance of hundreds of miles. This makes it possible over a large portion of the Great Plains to obtain sufficient water from wells, not only for stock but for crops. Some of the wells, notably in the Dakotas, are artesian, from which strong streams of water flow by natural pressure. A recent development in northwestern Texas is the use of pumps driven by oil or gasoline engines. A single well not more than 100 feet deep may furnish water to irrigate 160 acres. The supply of ground water seems inexhaustible but probably is not so. Whether large areas of

pasture can be in this way permanently converted into farm lands remains to be seen.

Crops. — The crops grown vary with the situation and climate. In the north alfalfa, grain, and sugar beets are staple products. In Colorado and the Pacific States, apples, pears, peaches, apricots, and other fruits are prolific and of superior quality. In the south grain and vegetables are grown in the cool season, and corn, tobacco, and cotton during the hot season. Alfalfa grows all the year round and yields six or eight cuttings. Citrus and other semitropical fruits are of prime importance in southern California. Their area can be extended by better shipping facilities. Of the 14 million acres of land now under irrigation, 80 per cent is in forage and grain to feed live stock which can be shipped to market. Fruit and vegetables are heavy and perishable and the cost of transportation is generally prohibitive.

Beet Sugar. — Of the two principal sources of sugar, cane cannot be grown far beyond the frost line, while beets require a growing season hardly as long and warm as corn. There are no natural obstacles to prevent the United States from being independent of foreign lands for a supply of sugar.

Like cane growing, the beet industry involves large capital, coöperation, and labor cost (p. 284). The factory for extracting sugar is costly and must be supplied with the product of hundreds of acres. The beets are bulky and heavy, and cannot be shipped far. They require a rich loam or muck soil, frequent rain in early summer, and a dry harvest. The cultivation, weeding, and harvesting involve hand labor, much of which can be performed by women and children. The crop of 10 to 15 tons per acre is hauled to the factory to be ground and pressed. The juice is evaporated until the sugar crystallizes out and the pulp is fed to stock (Fig. 182).

Sugar beets are well suited to the climate and irrigated lands of the Interior States, which produce nearly one half the crop of the United States; more than one fourth is grown in the Middle West and the rest in the Pacific States. The industry is strongly localized in a few counties. The leading states are Colorado,

Utah, and Michigan. Sugar beets are extensively grown in Europe, from central Russia to northern France. During the



FIG. 182.—Field of sugar beets. Factory in the background.

last 35 years the total yield of sugar from beets has been most of the time greater than that from cane.

Life on Irrigated Lands.—The ordinary farmer might imagine an ideal condition in which he would have such control of the weather as to command rain exactly when he wants it and in exactly such quantities as he needs. During the rest of the time the sun would shine from a nearly cloudless sky. There would be no bad seasons or years, and his crops would never fail. Relieved of all anxiety, he could calculate closely the yield of his farm. On irrigated land the farmer's dream comes true. At regular intervals he can turn water from the canal into his fields until the ground is saturated. It is measured out to him and he pays for it by the acre-inch, or the quantity necessary to cover an acre one inch deep.

Life on irrigated land differs materially from rural life in humid regions. The high value of the land, its extreme productiveness, and the cost of water

make large farms impossible. From 10 to 40 acres will support an average family in comfort. An irrigated area is an agricultural island in a desert sea. A dense population on a small area, surrounded by wide stretches of sparse population, tends to the growth of villages, in which all the homes may be located. Good schools, churches, libraries, and other social advantages are possible, but the manufactures and trade which give rise to a large city are lacking.

Summary. — The Interior States seem fitted by nature only for cattle and sheep ranching. Human skill guided by scientific knowledge will make use of a portion of the area for agriculture. (See Fig. 183.)

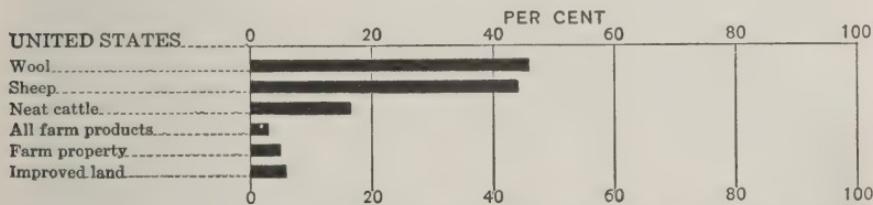


FIG. 183.—Rank of Interior States in farms and farm products. (See Table III, Appendix.)

QUESTIONS

1. What part is played by the horse in cattle ranching?
 2. Why has not herding on the American steppe produced a nomad economy like that of the Asiatic steppe (p. 32)?
 3. Why does Iowa raise nearly five times as many cattle as Wyoming?
 4. Is the future supply of wool likely to be sufficient? Why (pp. 217-18)?
- Is there any good substitute for it?
5. How do cultivation and mulching retard evaporation from the soil?
 6. Was the Garden of Eden irrigated? (See *Genesis* II, 10.)
 7. Why is drainage of irrigated lands necessary?
 8. What limits the possible supply of water to be obtained from a well?
 9. How is farming by irrigation preferable to dependence on rainfall?
 10. What use may be made of irrigation in humid regions like the Middle West?

CHAPTER XXVI

THE INTERIOR STATES: MINING

Early History. — The Spaniards from Mexico explored the southern part of the Interior States in search of gold and silver, but finding none, settled here and there upon great estates and raised cattle in an unenterprising way. At the close of the Mexican War in 1848 an immense area on the southwest was added to the territory of the United States, and in 1849 the discovery of gold in California brought a rush of adventurous fortune seekers from the east. In 1858 the discovery of gold on the South Platte, near the present site of Denver, swelled still further the flood of immigrants, in this case destined to settle in the region instead of merely passing through. From that time to the present, mining has played a large part in the economy of the far western states. Rich veins of ore yielding gold, silver, copper, lead, or zinc — usually two or more of these metals — occur in nearly every state and province from Alaska to Mexico.

Gold. — Gold and silver, on account of their high value per ounce and their use as money, appeal strongly to the imagination and greed of men. There are probably few square miles of mountainous territory which have not been visited by the prospector in search of precious metal.

Native gold occurs in veins of quartz, in grains so minute as to be in many specimens invisible. Wherever these veins outcrop on the surface, they have been decomposed by the weather and along with common sand and gravel washed down the stream beds. The separation of gold from gravel is called *placer mining*, and can be carried on with small outfit and capital. Two men can carry tent, blankets, tools, and provisions into rough and remote regions, and wash stream gravel in a pan or wooden trough called a

cradle. The coarser but lighter materials are washed away, while the heavy grains of gold are left in the bottom. The fine gold dust is caught on the rough surface of a blanket, or, if possible, mercury is used to absorb it. If the "diggings" prove rich, an elaborate system of ditches and sluices is constructed to wash gravel on a larger scale. In *hydraulic mining* a powerful stream of water from a pipe turned against a bank removes immense quantities in a short time and renders it profitable to work gravel poor in gold

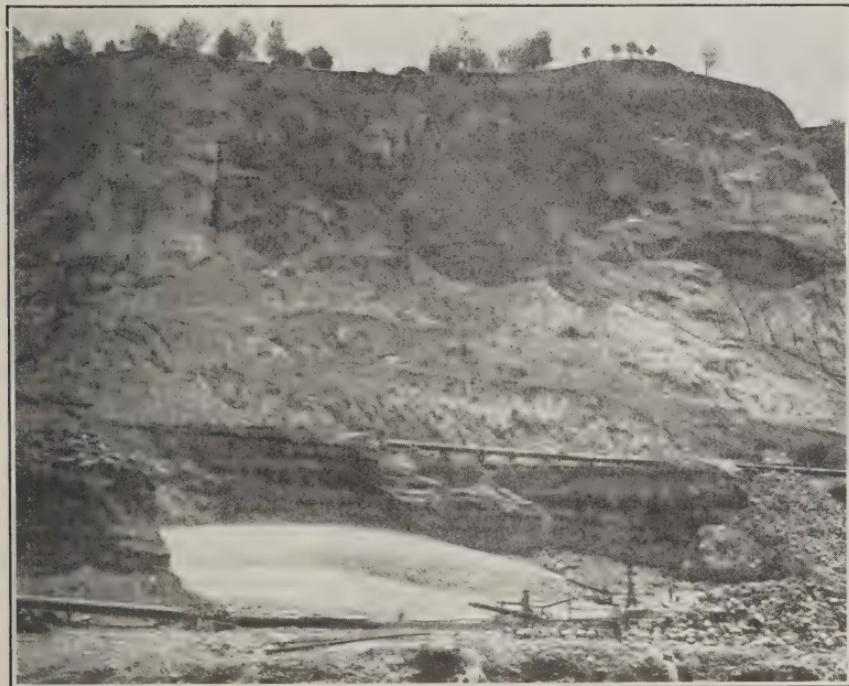


FIG. 184.—Hydraulic mining. Washing gold out of a gravel bank with jets of water, California.

(Fig. 184). The "mother lode," or vein from which the placer gold has been derived, is searched for and often found far up toward the mountain summit.

In *quartz mining* the gold-bearing vein is mined through shafts and tunnels by drilling and blasting, hoisted to the surface, and sent to stamp mills, where it is crushed to powder and the gold is extracted with mercury or other chemicals. The vein is followed down into the earth crust until it ends, or the mine is flooded with hot water, or some other difficulty makes it unprofitable. Quartz mining requires a large investment of capital

and is a hazardous business. Any day a thick vein may be found to thin out, or a rich vein may become poor, or the reverse may happen. The gambling element of chance is large and is the secret of much of the attractiveness of gold mining. Only a small proportion of mines pay and a small proportion of miners become wealthy.

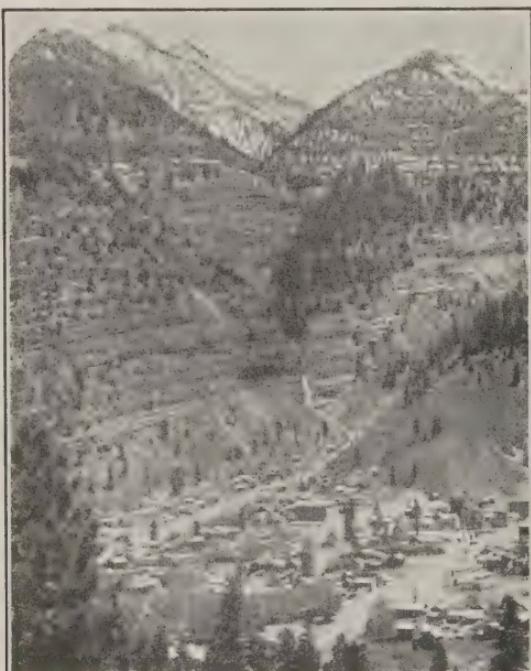


FIG. 185.—A mining town, Ouray, Colorado.

Other Metals.—Silver usually occurs along with gold, lead, copper, or some other metal in the same ore. Little can be obtained by placer mining, and the processes for extracting it from its compounds are rather complex. The ores of copper, lead, and zinc are smelted at a high temperature by methods not unlike those used in the case of iron (p. 208).

Mining Districts and Towns.—Mining communities and towns (Fig. 185) are liable to spring up in unfavorable and inaccessible locations, at great heights, or in the midst of a desert. They usually produce nothing but ore and are dependent upon outside sources for everything they use.

The Comstock lode, near Virginia City, Nev., yielded between 1860 and 1880 about \$360,000,000 in gold and silver. A community of 20,000 people was supplied with food, clothing, materials, and machinery from California, by a wagon road 162 miles long over the Sierra Nevada.

The Leadville district, on the headwaters of the Arkansas, was first a placer mining camp. Years after it had been exhausted and abandoned,

immense veins of lead ore, so rich in silver as to be worth a dollar a pound, were discovered, and it became the largest producer of silver in the world, outside of Mexico. A well-built city at an elevation of 10,000 feet, provided with all urban conveniences, has maintained itself by these mines for nearly 40 years. Silver is now a by-product, being exceeded in value by lead, copper, and zinc.

The Cripple Creek district, near Pikes Peak, 10,000 feet above the sea and too high for trees or bushes, produced in the first ten years after the discovery of gold more than \$120,000,000. Over 200 mines were in active operation and connected by electric car lines. The population was about 10,000. Leadville and Cripple Creek are served by railroads which climb the mountains at great cost to carry up machinery and supplies and to bring down ore to the smelters situated on the plain.

The Butte district in Montana, first famed for placer gold and later for silver, finally came to produce more copper than any other district in the world, and supports Butte, a city of 42,000 people.

The Black Hills, on the border of Wyoming and South Dakota (p. 305), have, in consequence of elevation, a good rainfall. A third of the area is covered with coniferous forest and the rest is good grazing land. Erosion has removed much of the original rock cover and exposed a mass of granite containing veins of gold, silver, copper, and tin. The ores are of low grade, but have yielded more than \$100,000,000 worth of gold and silver, and are still yielding about \$7,000,000 a year.

More recent examples of towns which have sprung up in a few weeks on account of the discovery of rich mines are Tonopah, Goldfield, and Bullfrog in the desert of southern Nevada. Here the auto truck has proved itself superior to animal power and competent to supply rapidly growing communities 100 miles from a railroad.

Coal and Iron. — These staple minerals are not wanting in the Interior States, but are of small importance compared with the rarer minerals. Coal is mined in Colorado, Wyoming, Montana, and New Mexico, but has given rise to special industries only at Pueblo, Col., where anthracite and iron ore in the mountains near by support the only important iron and steel works west of the Mississippi.

Comparative Values. — The value of copper exceeds the combined value of all other metals mined in the Interior States. Several districts in Ari-

zona give that state first rank in copper production, followed by Montana, Michigan, Utah, Nevada, and New Mexico (Fig. 186).

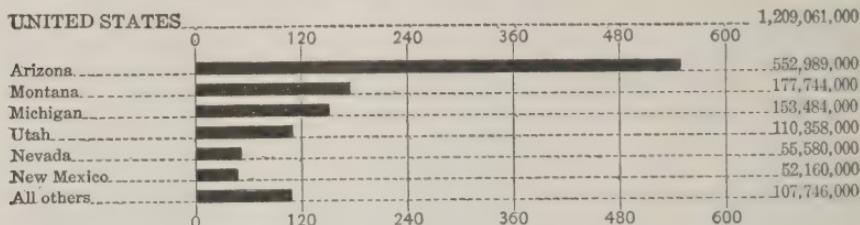


FIG. 186.—Production of copper (1920), by states, in millions of pounds.

Gold is second among minerals, with Colorado second only to California in value of product, and Arizona third (Fig. 187).

Silver holds third place and is more evenly distributed. It is important in Nevada, Montana, Utah, Idaho, Arizona, and Colorado (Fig. 187).

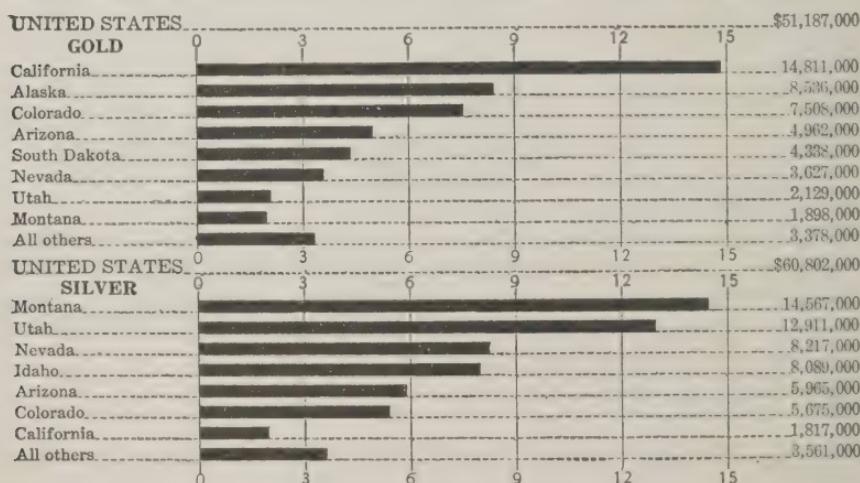


FIG. 187.—Production of gold and silver (1920), by states, in millions of dollars.

Lead stands fourth among metals, of which more than half comes from Idaho.

Arizona and Montana produce nearly all the zinc.

The large copper output of Arizona and Montana gives them the lead in total value of mineral products. Colorado and Utah stand high and close together, with the greatest diversity of minerals. New Mexico and Nevada form a less important group by virtue of copper, gold, and silver. The rank of Idaho depends upon lead, while Wyoming ranks third with

coal and petroleum and only trifling quantities of metal. The foregoing analysis shows clearly the wide distribution of mineral wealth in the Interior States.

Gold, silver, and copper are necessary to the welfare of advanced peoples and are, in that sense, invaluable; but the actual market value of those metals mined in the United States is less than that of eggs. Even in the Interior States, where the mining of the rarer and nobler metals is so conspicuous, the value of output is much less than that of agriculture and herding, and less than the value of the iron and coal of the Middle West.

Mining Economy. — While mining and mineral industries are essential to the existence of industrial civilization, they are, in contrast with agriculture and herding, collective economies, wholly destructive of natural resources. They are inroads upon what may be called the capital stock of the human family laid up in the bank of the earth crust, which can never be replaced. Their products are "economic plunder."

Mining communities and towns are characterized by rapid growth, but their economic basis is uncertain. This is especially true of gold and silver mining. Their success or failure cannot be foreseen. The large rewards possible for the few and the losses sure to befall the many appeal strongly to the gambling instinct and favor recklessness and violence. Newly discovered diggings in remote regions are infested with professional gamblers and criminals of many kinds who prey upon those engaged in legitimate business. The usual restraints of law, social custom, and domestic relations are absent, and every such community passes through a period of lawlessness and savagery. If the mines hold out, capital is invested, relations are established with older communities, and mining life becomes settled and orderly. A mining town, based on a single resource, may endure, like Leadville, for generations, or sink into insignificance, like Virginia City. No vein of ore or bed of coal is inexhaustible. When it is worked out, all the economic activity and human life dependent upon it must disappear from that locality.

In mountainous and arid regions mining is a pioneer industry, which first attracts population, labor, and capital. Agriculture, manufactures, and commerce follow, and all the natural resources come to be more fully utilized.

Summary. — The broken and mountainous parts of the Interior States contain rich veins of copper, gold, and silver. Mining camps and towns flourish for a time in places difficult of access and unfavorable for any other economy. (See Fig. 188.)

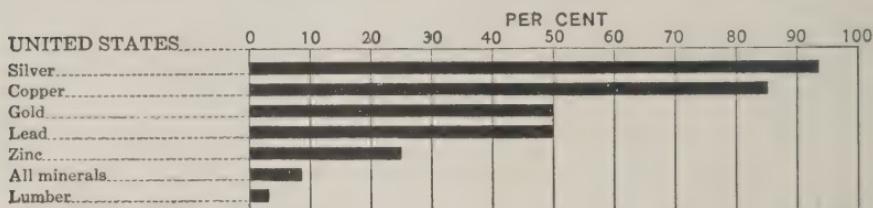


FIG. 188. — Rank of Interior States in mineral and forest products. (See Table IV, Appendix.)

QUESTIONS

1. Put a mixture of sand, gravel, and shot in a pan with water and by rinsing and pouring separate the sand and gravel from the shot. Whence came the expression "to see how it will pan out"? What does it mean?
2. Why is gold worth about \$20 an ounce and silver about 60 cents?
3. If the total quantity of gold in use should be doubled in a year, would it be a benefit or an injury to mankind?
4. Why is gold used as a symbol of excellence in such expressions as "golden age," "golden opportunities," "golden opinions," "golden rule"?
5. When a man is going into a remote and uncivilized country, why does he carry his funds in gold?
6. Which would be worth more to a man left alone on a desert island, iron or gold?
7. Why is a community based on mining economy in many cases rough and lawless? why shifting and uncertain?

CHAPTER XXVII

THE INTERIOR STATES: TRANSPORTATION AND CITIES

Early Methods of Transportation. — The plateaus and mountains of the Interior States form a barrier more difficult to cross than the ocean. The traveler from the east faces 300 miles of steppe, 300 miles of rugged mountains, 400 miles of desert, and a second mountain barrier 7000 to 10,000 feet high before reaching the Pacific slope. The largest river, the Missouri, comes from the north, and the shallow and shifting character of the trunk stream and its tributaries makes them nearly useless as waterways. The Colorado flows southwestward through impassable canyons. In the northwest the Columbia and Snake are circuitous and broken by falls and rapids. The arid, western half of the United States is almost without navigable streams. The smooth, gently sloping surface of the Great Plains is favorable for land travel, but the distances are long, the mountain climbing is difficult, and the scarcity of food, and in some places of water, on the way, constitutes a serious obstacle.

Between 1846 and 1850 a great migration of Mormons to Utah, settlers to Oregon, and gold seekers to California took place "across the plains." The main "emigrant trails," starting from the Missouri, reached Oregon by the valleys of the Platte, Snake, and Columbia; Great Salt Lake by the Platte and Sweetwater, thence to California by the Humboldt; and Santa Fe by the Arkansas. The "prairie schooner," a canvas-covered wagon drawn by oxen, was the home of men, women, and children on the move for five or six months (Fig. 189). The number of these transient people amounted in some years to 250,000. Ten years later freight caravans of 25 or more wagons, each carrying about 8 tons and drawn by 12 teams of mules or oxen, reached Denver in about a month. The Overland Mail coach carrying 17 passengers reached San Francisco by the Santa Fe route in 23 days, and later

by the Salt Lake route in 17 days. The Pony Express carried letters only from St. Joseph, Mo., to San Francisco in 10 days. Under these conditions, the Pacific States were less accessible and in economic relations more foreign than Europe.



FIG. 189.—A train of prairie schooners crossing the plains.

Railroads.—At the close of the Civil War, capitalists were induced by a liberal grant of land and credit from the Federal Government to undertake the construction of a Pacific railroad, which was completed in 1869 from Omaha, via Salt Lake City, to Sacramento. Railroad grading across the plains is easy and inexpensive. In crossing the mountains all the skill known to engineering and a large expenditure of money are required to lay out and construct practicable lines. The general plan is to follow the valley of a stream, in many cases a narrow canyon, as far up toward the crest as possible, then by zigzags and loops to reach a pass or a ridge narrow enough to be tunneled, then to descend on the other side by a similar route. The line is made as long as possible in order to lessen the steepness of the grade, but in some places very heavy engines are required to pull a few cars. It is said that “an engine can be made to go anywhere a mule can,” and this is true provided there is money enough to pay the cost. Some of the most daring and expensive feats of

railroad engineering are found in the Central Rockies, where the Denver and Rio Grande and other lines have been built to reach mining camps and towns.

Railroad Systems. — There are now seven railroad systems in the United States which connect the Mississippi or the Great Lakes with the Pacific coast. Two of these traverse the middle Interior States, crossing the Central Rockies where they are widest.

The Union Pacific and the Central Pacific formed the pioneer line, built from Omaha west and from Sacramento east until the two lines met at Great Salt Lake. It follows closely the route of the Salt Lake trail, touching Denver, Cheyenne, Salt Lake City, Ogden, and Sacramento, and now has a branch along the Oregon trail to Portland.

The Missouri Pacific, the Denver and Rio Grande, and the Western Pacific form a connected route from St. Louis to San Francisco, parallel with the Union and Central Pacific and not far from them. It crosses the mountains through the headwater canyons of the Arkansas and Colorado rivers.

Two lines follow a southern route crossing the plateaus where the mountain barrier is narrow and less difficult. *The Atchison, Topeka, and Santa Fe*, the longest of the Pacific lines, extends from Chicago to San Francisco, following the Santa Fe trail and the Overland Coach route, via Kansas City, Pueblo, and Santa Fe, with a short branch to the Grand Canyon of Arizona.

The Southern Pacific is the shortest, crossing the continent from New Orleans and Galveston to Los Angeles and San Francisco, touching the Mexican border at El Paso and Yuma.

Three lines cross the northern states from Chicago, Duluth, and St. Paul to Puget Sound. They are in few places more than 200 miles apart, very near together in the mountains of Idaho and intersecting at Spokane. They cross the Great Plains where they are widest and the Northern Rockies where they are broken by the headwaters of the Yellowstone and Columbia. *The Chicago, Milwaukee, and St. Paul* takes the most southerly route of the three as far as the Yellowstone River. *The Northern Pacific* in its eastern part is midway between the other two, passing through Fargo and Bismarck. It follows up the Yellowstone to Livingston, where a branch runs to the Yellowstone National Park. *The Great Northern* is nowhere far from the Canadian boundary and skirts the edge of Glacier National Park. It is notable for a score of short branches, reaching northward to and into Canada, like the limbs of a tree.

The Canadian Pacific, scarcely anywhere more than 100 miles north of the boundary of the United States, crosses the continent at its widest part, from Halifax and St. John to Vancouver, with branches to Detroit, Chicago, St. Paul, Duluth, Spokane, and Seattle. The scenery of its mountain division is the grandest accessible by any of the Pacific routes.



FIG. 190. — A railroad in Cimarron Canyon, Colorado.

Railroad Construction and Operation. — Many conditions render the construction and operation of all the so-called Pacific railroad systems, or those which connect the Atlantic division of the United States with the Pacific coast, difficult and costly. They are from 1500 to 3000 miles long. They cross two great

mountain systems, where a right of way has to be almost literally hewn out of solid rock, and where steep grades and sharp curves require powerful locomotives (Fig. 190). The northern lines are often blockaded by the winter snowfall, and the southern lines traverse deserts which furnish no water. All suffer from lack of fuel for motive power. Coal in Colorado, Wyoming, and New Mexico, lignite in Montana and Alberta, and petroleum in Texas and California make their operation possible. Most of the mileage of each lies in regions of few resources and sparse population. The local freight and passenger business is trifling in amount compared with the through traffic and long haul. Therefore, freight charges are comparatively high, in spite of the competition which has followed the opening of the Panama Canal.

Scenic Attractions. — Passenger travel is greatly increased by the scenic attractions. The Grand Canyon of Arizona, the Royal Gorge of the Arkansas, the canyons of the Gunnison and the Grand, the peaks and "parks" of Colorado, the geysers and falls of the Yellowstone, and the glaciers and lakes of Glacier Park (Fig. 191) are among the most valuable resources and assets of the region, a fact of which the railroad companies are fully aware. The pleasure and inspiration derived from grand scenery, the health and vigor found in mountain and desert air, the chapters of the earth's pre-human history read in the cliffs and canyons, have values which cannot be estimated in dollars. Perhaps the plateaus, mountains, and deserts are worth as much to mankind as would be an equal area of corn land.

Cities and Urban Population. — Natural economic conditions in the Interior States are unfavorable to the existence of large cities. Out of 24 cities of over 10,000 people, there are only two of over 50,000, both of which have over 100,000. In four states there is no city of 25,000, yet a total urban population of 36 per cent emphasizes the general sparseness. The density of population varies from 9 to the square mile in Colorado, to 0.7 in Nevada, with an average for the region of 3.7. The small population is partly due to remoteness, difficulty of access, and late



FIG. 191.—Scenery in Glacier National Park. From the upper lake to the lower the fall is 1500 feet.

settlement, but lack of water will probably prevent any of the Interior States from ever becoming as populous as those of the Atlantic division. (See Fig. 37.)

Denver (256,000).—“The Queen City of the Plains,” the metropolis of the Interior States, occupies a central position in their area and economy. It is midway between the Mexican and the Canadian boundary and 200 miles nearer to the Missouri

River than to the Sierra Nevada. It lies at the western edge of the Great Plains and 15 miles from the front range of the Rocky Mountains. (See Fig. 192.)

The city had its birth as a placer mining camp on the South Platte River and became at once the center of the gold diggings in the Pikes Peak district.

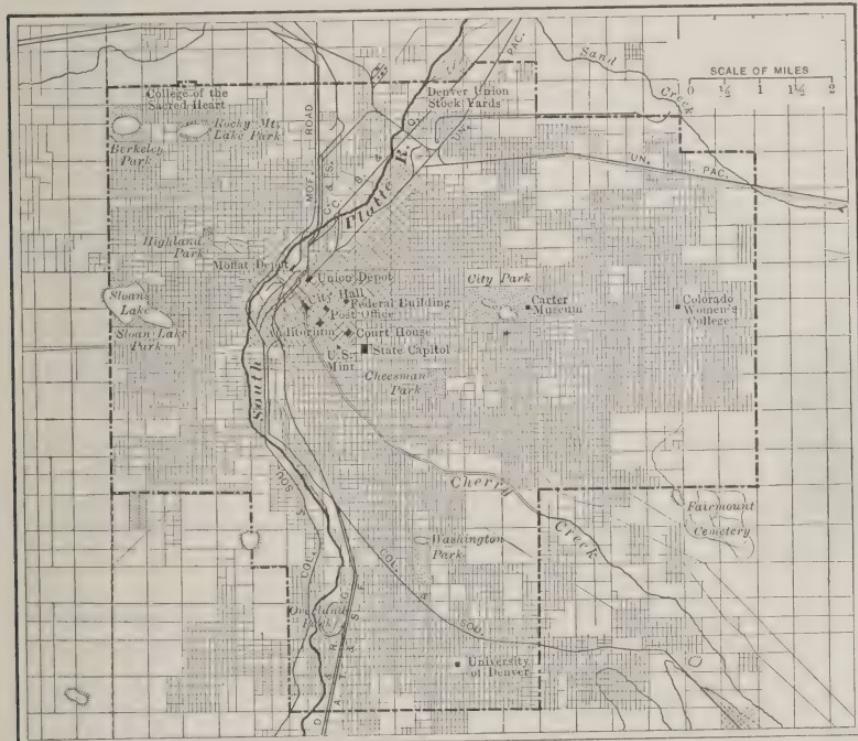


FIG. 192.—Denver.

The first decade of this pioneer settlement, 500 miles from any seat of organized government, was especially stormy. The citizens had to take the law into their own hands and repress gambling and crimes of violence by a band of volunteer police called *vigilantes*. The organization of the territory of Colorado, afterwards admitted as a state, of which Denver became the capital, and the construction of a branch from the Union Pacific Railroad in 1870, brought settled and orderly conditions. The city thrived on the freighting business of the mines, carried on at first by wagon (p. 333),

and in ten years after the coming of the railroad multiplied its population by seven.

Denver is now served by nine railways, of which three are transcontinental, two others connect it with the Middle West, and the rest form a network reaching every important mine. Streams issuing from the mountain canyons afford many opportunities for irrigation. Denver is a market for grain, fruit, vegetables, and live stock and a wholesale distributing center for several states. The value of products from a great variety of industries is over \$125,000,000 a year. Slaughtering and meat packing and the smelting and refining of lead are the most important.

Native building stones in great variety give substantial and imposing character to the buildings. The state Capitol of granite and marble stands at an elevation of exactly one mile above the sea. Denver is a center for travelers attracted by the healthful climate and beautiful scenery of the mountains, and the tourist business is an important source of wealth.

Other Cities. — *Pueblo* (43,000) on the Arkansas, 120 miles south of Denver, stands in front of the principal gateway to the mountains and is an important manufacturing city. It is probably the greatest center for smelting ores in the United States, and is the site of iron and steel works which have given it the name of "the Western Pittsburgh."

Colorado Springs (30,000), at the foot of Pikes Peak, is surrounded by magnificent scenery, of which the Garden of the Gods and Monument Park are city property. The streets are wide and well shaded. It is a city of residences and hotels, and the chief pleasure and health resort of the Rocky Mountains.

Salt Lake City (118,000), "The City of the Saints," is the only city in the United States which owes its origin directly to a religious movement. It was located in 1847 at the foot of the Wasatch Mountains, 10 miles from Great Salt Lake, by Brigham Young, the leader of the Mormons, who foresaw with rare discernment the possibilities for irrigation in the desert valley (p. 319). The first settlers grew rich by outfitting the gold seekers on their way to California (p. 326). It has been from

the first the headquarters of the church of the Latter-day Saints, and until after the construction of the Union Pacific Railroad had an independent government controlled by the church. Much of its growth has been due to the immigration of Mormon converts from Europe.

(See Fig. 193.)

The city is laid out in squares of ten acres, separated by streets 132 feet wide, many of which are bordered by trees and streams of water for irrigation. The most prominent buildings are the many spired Mormon Temple, to which no "gentiles" are admitted, and the elliptical Tabernacle, which seats 10,000 people. It is an important way station on two Pacific railway lines and is the terminus of a road which traverses the heart of the desert from Los Angeles. It is the business center for the irrigated areas of the Jordan valley (p. 319), for the mining districts of the Wasatch and other ranges, and for the sheep husbandry of the Great Basin.

Butte (43,000) owes its existence and wealth to the copper mines which surround it (p. 329). Hydroelectric power is supplied to mines and factories from the mountains. The sulphurous fumes from the smelters which once killed all vegetation have been abated. The per capita wealth of the citizens is said to be the greatest in the United States.

Summary. — Mountainous relief, aridity, scarcity of fuel, and long distances in the Interior States make transportation difficult

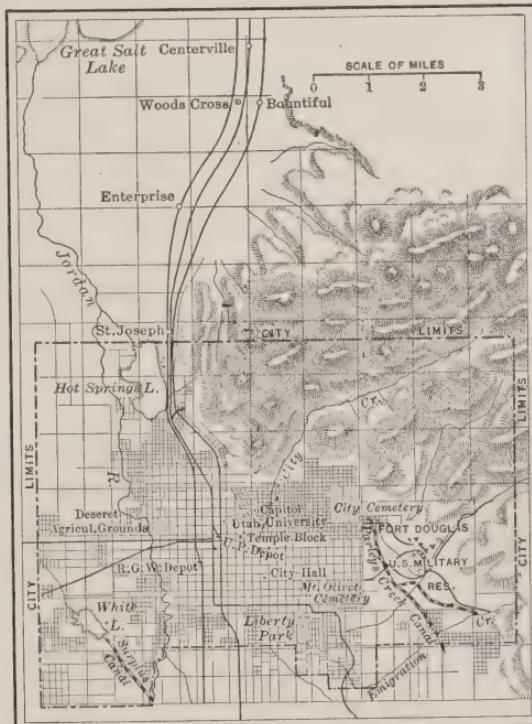


FIG. 193.—Salt Lake City and vicinity.

and costly. The same conditions render the population sparse and cities few, of which the larger are mining centers.

Economic Rank. — The arid regions are in a transition state of economic development. The value of crops grown now exceeds that of cattle and sheep sold. Perhaps one fourth of the area will be utilized by some kind of agriculture. The Interior States stand in a peculiar tributary relation to the humid east, upon which they depend for a market for metals, cattle, and wool. The region belongs to the second class of complex economic societies (p. 92), and it is probable that interior position and aridity will keep it in a stage of economic youth.

QUESTIONS

1. Why is the natural barrier between the Middle West and the Pacific States greater than that between the Eastern States and Europe?
2. How many miles an hour did the horses of the Pony Express travel?
3. Why do people who travel for pleasure go in greater numbers to Europe than to the Rocky Mountains and Pacific coast?
4. How does lack of water prevent dense population? Why does the western half of the United States look so different from the eastern half on the maps, Figs. 29, 33, 34?
5. If the mines of Colorado should be exhausted, would Denver become an unimportant town?
6. Does the future development of the Interior States depend more upon the growth of mining, herding, or agriculture? Why?
7. Are scenery, healthful climate, and opportunities for geological and botanical research natural resources of economic value?
8. Which is of more value to mankind, the Hudson River or the Colorado River? Why?

CHAPTER XXVIII

THE PACIFIC STATES

Natural Conditions. — The three states which border the Pacific Ocean are marked by diversity of relief, climate, vegetation, and economic products. They are a land of contrasts. (See Figs. 29, 31, 32, 33, 34, 35, 172.)

Within their boundaries occur the highest and the lowest points of land in the United States, the regions of greatest and of least rainfall, the hottest places and the places which are most temperate, a tract of absolute desert, and an area of almost impenetrable forest. The sea, the desert, palm groves, mountains, fir forest, and summer snows are visible in the same landscape. Although they extend north and south as far as from Maine to Florida, natural conditions vary more within 200 miles of the coast than they do throughout their whole length. This is due to the lofty mountain system which extends parallel with the coast and renders elevation and distance from the sea more important than latitude. Those parts which lie east of the mountains belong to the natural region of the Interior States (p. 303). The narrow strip west of the mountains constitutes a natural region by itself, sharply distinguished from the rest of the country.

The resources include the products of temperate zone rainfall and of tropical, irrigated desert, the pastures of steppe and mountain, the timber of coniferous forests, and some of the richest metal-bearing veins in North America. The long coast line faces the Orient from Siberia to the South Seas, and the Pacific ports carry on a growing trade with Alaska, Hawaii, the Philippines, Japan, China, India, Australasia, and western South America.

Area and Population. — California, Oregon, and Washington comprise about 11 per cent of the area (Fig. 36) of the United States and have 5.3 per cent of the population, with an average density of 17.5 persons to the square mile. About half this area lies in the arid interior region and has a sparse population. The total population is less than that of Ohio. In position and climate the Pacific States are highly favored. Their possibilities are limited by mountainous surface, a forbidding coast, narrowness of productive space, poverty of hinterland, and 1000 miles of desert, mountain, and steppe between them and the rich and populous Atlantic division.

Relief. — *The Pacific Cordillera.* — The coast of the Pacific States is bordered by a double chain of mountains with a central valley between. The eastern member, about 150 miles inland, consists of a single, continuous chain about 50 miles wide, which rivals the Rocky Mountains in height. In Washington and Oregon the Cascade Range is chiefly of volcanic origin and contains many peaks rising above 10,000 feet, of which Rainier, Shasta, Hood, and Lassen are symmetrical cones, the last an active volcano. The range is cut in two by the Columbia River. The Sierra Nevada in California is a single, massive, tilted block with a very steep slope on the east. The highest point in its even crest, and the highest in the United States, is Mt. Whitney, 14,500 feet. There are few passes lower than 7000 feet. The southern end curves westward and joins the Coast Range 200 miles north of the Mexican boundary. The western member of the Pacific mountain system consists of the *Coast Ranges*, which are lower and far less massive than the eastern. They extend from the Strait of Fuca to Lower California. They are widest in California, low and simple in Oregon, and highest in northwestern Washington, where the Olympic Mountains reach 8000 feet. They are cut through by the Columbia and Sacramento rivers, and many smaller streams.

The Intermont Valley. — The long valley between the two

mountain systems is not continuous but divided by the Klamath Plateau in Oregon and California. The northern part is occupied in Washington by Puget Sound and in Oregon by the valley of the Willamette River. The southern part forms the great central valley of California, 450 miles long and 50 miles wide, an area about half as large as Pennsylvania.

The Intermont Plateaus. — In northern Washington the Rocky Mountains extend westward to the Cascade Range. The southeastern third of that state and the eastern half of Oregon lie on the Columbia Plateau (p. 308). Northeastern and southeastern California form a part of the Great Basin (p. 308), in which two depressions, Death Valley and Salton Sink, are nearly 300 feet below sea level.

Coast line. — The Pacific coast is high, steep, and smooth, with long lines of cliffs and a few small, shallow bays. There are three great inlets. At the north the Strait of Fuca admits the sea about 100 miles inland. From its eastern end Puget Sound opens southward 75 miles, and with its arms affords about 2500 miles of shore line and many deep, protected harbors. The lower Columbia River is wide and navigable for ocean vessels 112 miles to Portland. Midway of the coast line, the Golden Gate leads into San Francisco Bay, one of the finest harbors in the world. Near the Mexican boundary a bar incloses the small but commodious bay of San Diego.

Climate. — The climate of the Pacific States is as varied as their relief. The prevailing westerly winds from the Pacific, cool in summer and warm in winter, bring to the coast lands a mild, oceanic climate, modified in the north by cyclonic disturbances. The temperature varies from west to east more rapidly than from south to north. On the southern lowlands frost is rare, and southeastern California is one of the hottest regions in the world. On the mountains winter temperatures fall to -30° . The rainfall increases from less than 10 inches in the south to more than 100 inches in the north, with a large excess in winter. The summers in the south are almost rainless. On the northern

Sierra Nevada the rainfall increases from 24 inches at Sacramento to 50 inches at the summit and falls to 6 inches within 50 miles east in the Great Basin. Most of California south of San Francisco has less than 20 inches and the Mohave and Colorado deserts in the southeast are nearly rainless. The snowfall on the mountain summits amounts in some places to 40 feet and the highest peaks support permanent snowfields and glaciers.

Vegetation. — The heavy rainfall of the mountains and northern valleys supports a coniferous forest of unrivaled density and value, covering about one third of the area of the Pacific States. In the Great Valley and on the southern coast lands of California the peculiar dry forest, characteristic of subtropical regions with dry summers, prevails (p. 66). East of the mountains only a scant desert vegetation can exist, a large part of which in Oregon is made up of sage brush. The climate of the Pacific coast belt permits northern and southern plants to overlap and intermingle, resulting in an astonishing number and variety of species.

Drainage. — The Columbia, flowing from the seaward, rainy side of the northern Rocky Mountains, is by far the largest river of the region. The main stream winds circuitously through canyons in the lava plateau to the mouth of the Snake River, then turns westward, cuts through the Cascade and Coast ranges and reaches the sea with a width of five miles. Canals around the rapids make it navigable for about 500 miles from the ocean. The valley of California is drained by the Sacramento and San Joaquin rivers to San Francisco Bay. Their many tributaries from the Sierra have very rapid fall and a fairly constant volume, and are used for power in mining and for irrigation. East of the mountains and south of the Columbia basin the streams are small and empty into "sinks" or salt lakes. The Coast Ranges give rise to many small rivers flowing to the Pacific.

Economic Development. — In the development of the Pacific States, herding, mining (Fig. 194), cereal agriculture, horticulture,

and lumbering have become prominent one after the other. No one of these economies has displaced those which preceded it and each maintains its importance in the present life of the region.

Under Spanish occupation stock raising was almost the only business, and cattle, horses, and sheep multiplied on vast estates. Hides and tallow were the chief products. After a severe drought in 1862-4 cattle ranching declined and wool-growing sheep increased in number until the ranges and forest pastures were in danger of destruction. They are most numerous on the dry plains of eastern Oregon (Fig. 176). After 1848, under American control, wheat raising on ranches of 5000 to 50,000 acres became prominent, especially in the northern part of the valley of California. Here the level land and the absence of summer rain permit the use of machinery on a grand scale. The ground is prepared by gangs of steam plows, and harvesters drawn by 30 horses cut and thrash the grain and leave it in sacks. Only a few such farms now remain, most of them having been divided into small holdings. The principal wheat region has shifted to southeastern Washington, where about twice as much wheat is raised as in California.

With the spread of irrigation since 1880, vegetables and fruits grown on small holdings have become more prominent



FIG. 194.—A gold mine.

than live stock, gold, or grain. While the present is an era of fruit in the south and lumber in the north, the persistence of all makes a well-balanced diversity of products, with a corresponding activity in manufacture and commerce.

Summary. — Location in a narrow strip along the Pacific coast, distance from the Atlantic division, and extremes of relief, climate, and vegetation, combine to set apart the Pacific States as a distinct and peculiar economic region.

QUESTIONS

1. Of what value to the Pacific States are the Coast Ranges? the Cascade Mountains and the Sierra Nevada?
2. Why do the isotherms in Fig. 31 extend parallel with the Pacific coast?
3. How does the Pacific coast of the United States compare with the Atlantic coast in (a) outline, (b) elevation, (c) climate, (d) advantages for commerce?
4. Why is commerce with Asia less than with Europe?
5. Will there ever be on the Pacific coast four large cities as near together as Boston, New York, Philadelphia, and Baltimore? Why?

CHAPTER XXIX

THE PACIFIC STATES: COLLECTIVE AND PRODUCTIVE INDUSTRIES

Agriculture. — The Pacific States have a great variety of soils. Western Washington was covered by the ice sheet from Canada and its soils are glacial. The soils of the Columbia Plateau are of volcanic ash or decomposed lava. Over large areas they are deep, fine, easily worked, and rich in plant food, but in some districts are alkaline. Wherever rainfall or irrigation water is sufficient, large crops can be raised for years without fertilizers. About one fourth of the area of the Pacific States is included in farms, but only 5 per cent is improved land (Fig. 195). Most

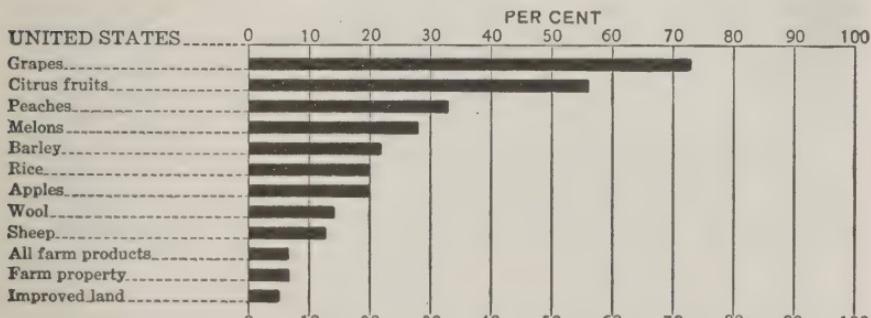


FIG. 195. — Rank of Pacific States in farms and farm products. (See Table III, Appendix.)

of the land available for agriculture without irrigation lies in the Intermont Valley north of San Francisco. The valleys of the Coast Ranges and portions of the Columbia Plateau are moist and arable. Of the crops grown without irrigation, hay has the greatest value, and wheat is the most important grain, amounting

to 8 per cent of the crop of the United States. About one half of it comes from southeastern Washington. Barley is a notable crop in California and hops in Oregon. Of the 3,400,000 cattle on farms nearly one third are milch cows, and dairying is a growing industry. In the arid regions east of the Cascade Mountains, cattle and sheep ranching are the principal occupations, but both have declined with the extension of agriculture. Large herds of cattle are kept also on the coast lands which are too wet for cultivation.

Irrigated Lands. — The Pacific States contain more than one fourth of all the irrigated land in the United States. California

was the pioneer state and now exceeds all other states in irrigated acreage.



FIG. 196.—An irrigated orange grove in California. The water is being let out of the canal into the ditches.

Among Federal reclamation works partly completed, the largest are the Klamath project in Oregon and California, 180,000 acres, and the Yakima project in Washington, 600,000 acres (Fig. 181). On irrigated lands in the north, alfalfa, grain, and vegetables are grown. In Oregon and Washington, orchard fruits, especially apples, are very prolific and of superior size and beauty. Natural facilities for irrigation extend along the

whole length of the Great Valley, where streams a few miles apart descend from the Sierras and emerge from canyons upon the plain. Each has built a fan-shaped pile of alluvial material which slopes from the canyon mouth to a convex margin. By the meeting of adjacent fans an almost con-

tinuous alluvial plain has been formed along the mountain foot, over which water can be distributed at will. Southern California is irrigated largely from wells, but the ground water is derived from the rainfall on the mountains.

California is one of the great fruit growing regions of the world and in this has no rival among the states of the Union. This is a direct response to the peculiar climate which resembles that of the Mediterranean region (p. 67). The mild winters, the absence of frost, the long dry summers, and the sunshine of 200 to 250 days in the year furnish the conditions for the ripening of subtropical and tropical fruits, and only soil water is needed to make them luxuriant (Fig. 196).

Oranges. — The value of oranges exceeds that of any other fruit. The variety known as the seedless Washington navel holds first rank. The trees ripen fruit all the year around. As many as 16 million boxes, valued at as many dollars, and filling 40,000 cars, have been shipped in a single year.

Orange culture partakes somewhat of the hazardous nature of gold mining. The large rewards of success tempt people to venture without sufficient capital, knowledge, or facilities. In good years a surplus is liable to occur with resulting low prices or lack of market. Markets for California fruit are found chiefly in the Eastern States. This demands a long and expensive haul in refrigerator cars. High freight rates have compelled growers to let their fruit rot on the ground. An occasional freeze, such as that of January, 1913, may cause a loss of many million dollars. Orange groves are generally provided with some means of artificial heat. Open fires, hot-water pipes, or the dense smoke from burning petroleum may save the orchards from injury. The problems of irrigation, protection, packing, and marketing fruit demand a high degree of intelligent coöperation and exert wide social, economic, and political influence.

Grapes. — California produces nearly as many grapes as all the rest of the United States. There are varieties adapted to nearly every soil and situation in the state, some of which do best on unirrigated land. The crop is about equally divided between wine grapes and raisin grapes. California wines are

famous all over the world but are sold largely under French labels. Raisins are made by drying sweet grapes in the sun.

Other Fruits. — California supplies the market of the United States with dried plums (called prunes) and apricots, and canned peaches, pears, cherries, apricots, and nectarines, all of the best quality. Those peculiarly Mediterranean and tropical fruits, olives, figs, dates, pomegranates, and almonds, do well in many parts of the state. Southern California, with portions of Arizona, enjoys those tropical conditions which the United States needs and generally lacks to make the range of its domestic resources complete.

Fisheries. — The salmon of the Pacific coast furnished to the Indians a food supply as abundant and easily secured as the coconuts and breadfruit of tropical islands (p. 20). In the spring these fish ascend the rivers from the sea in enormous numbers, taking no food during the journey of perhaps 1000 miles to the lakes where they spawn. Only the young fry ever descend,



FIG. 197. — Salmon fishing, Washington.

floating downstream tail first. The adult fish, weighing from 10 to 75 pounds, are caught with wheels, nets, and hooks, and canned (Fig. 197). The catch was at one time so large as to threaten the species with extinction. State laws for the regulation of fishing and the work of the United States Bureau of Fisheries in restocking have restored the rivers to something like their original abundance.

Minerals and Mining. — *Gold.* — The name California is more closely associated with gold than any other in America. The



FIG. 198. — A dredge excavating gravel for gold, California.

discovery of gold in a mill race in the Sacramento valley in 1848 was one of the great events of American history. It caused a rush of 100,000 emigrants from the east in one year, half of them going overland. Diggings on the streams flowing from the Sierra which yielded to the miner \$500 to \$5000 a day were not unusual. In the first ten years more than \$500,000,000 was taken out. The surface placers were first exhausted. Many old valleys filled with gravel and buried under lava flows were blasted and washed out by the hydraulic process (Fig. 184). The mother lode

was located and opened along the Sierra for 150 miles and still yields about \$10,000,000 a year. Nearly as much more is obtained by excavating alluvial lands by means of dredges which bring up gravel from depths down to 70 feet (Fig. 198). Mining operations are carried on by hydroelectric power and the whole region is covered by a network of cables for transmitting electricity from power houses to mines. California is the leading state in the production of gold, yielding more than one fourth of the total for the United States (Fig. 187).

Copper from the Klamath Mountains is second in value among metals. The Coast Ranges near San Francisco have long been one of the world's few sources of *mercury*. About 3,000,000 tons of *coal* are mined in central Washington. The general lack of coal is made less serious by the great number of streams which supply hydroelectric power to mines and cities.

Petroleum. — Several very rich fields in southern California gave that state for a time first rank in quantity of petroleum produced,¹ amounting to about two fifths of the output of the United States. Its composition is so different from that of eastern

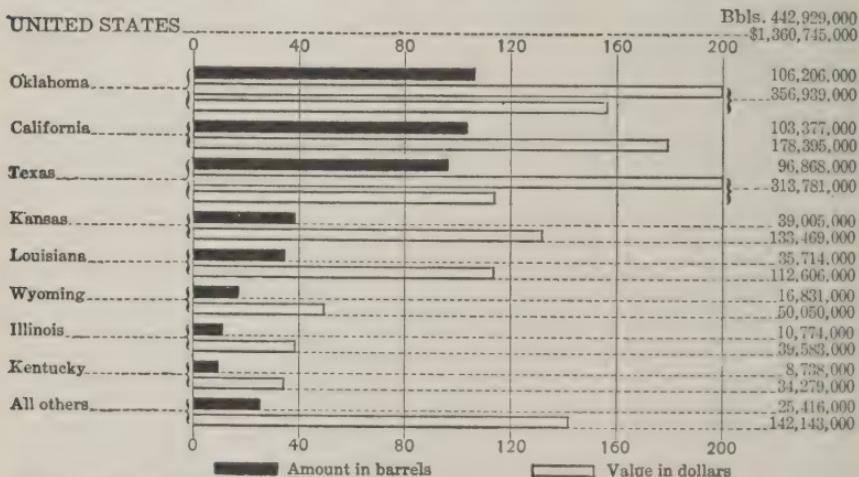


FIG. 199.—Production of petroleum (1920), by states, in millions of barrels and in millions of dollars.

¹ Since 1915 Oklahoma has held first rank and California second.

oil that its value is only about one half as much. It takes the place of coal in locomotive engines and, as used in recently invented marine engines, forms the cheapest source of power for water transportation in the world.

Nearly all the *borax* of the country comes from the waterless Death valley. The 20-mule teams which once hauled it in wagons to the railroad are now displaced by motor trucks. The total value of minerals in the Pacific States is less than half that of farm crops.

Lumbering. — The Pacific States contain the most valuable coniferous forest in the world. It covers more than one third of



FIG. 200. — Fir trees in the Washington forest.

the total area and is distributed strictly according to rainfall. The Coast Ranges north of San Francisco, the seaward slopes of the Cascades and Sierra up to 10,000 feet, and part of the northern valley are heavily wooded (Fig. 61). The treeless tracts are confined to areas of less than 20 inches of rainfall. The most important tree is the Douglas fir, often called Oregon pine, which grows to a height of 300 feet. Cedar, hemlock, pine, and

fir of many species form a lower but dense growth. In number of species and size and beauty of trees, this surpasses all other coniferous forests known. The yield of timber is in many cases ten times as much per acre as that from the eastern forests (Fig. 200).

In California there are small areas of two peculiar and remarkable species. About 2000 square miles of the Coast Range are occupied by redwood trees which are often 10 to 15 feet in diameter and 200 feet to the lowest limb. They stand so close that a wagon can hardly be driven between them. Single acres have yielded 1,500,000 board feet of lumber, and single trees 100,000 feet. The wood rivals the white pine (p. 140) in lightness, durability, grain, and ease of working, and is superior to it in beauty of color. The famous "big trees" occur in scattered groves on the Sierra slope. Some are 25 feet in diameter, 300 feet high, and 2500 years old. Most of them are protected in national or state reservations. To fell the immense trees of the Pacific forest, to cut and transport the logs, and to saw them into merchantable lumber require extraordinary methods and machinery. The work has been carried on in a wasteful manner, but better methods now prevail. (See Fig. 201.)



FIG. 201.—Logging in Washington forest.

A great deal of lumber is exported in sailing vessels to South America, Japan, Australia, and even to South Africa and Europe. The scarcity and high price of lumber in the Eastern States are now sufficient to overcome the cost of the long haul by rail, and Pacific coast stuff goes into the construction of houses throughout the Middle West. The opening of the Panama Canal furnishes a new and cheaper outlet for lumber from the Pacific States to the Eastern States. The Pacific States supply about 27 per cent of the lumber products of the United States, exceeding the other forest districts except the southern, with the certainty of an indefinitely large increase in the future. Nearly three fourths of the Pacific forest area is included in National Forest Reserves which are protected from fire by an efficient force of forest rangers. Washington leads all states in lumber resources and production (Fig. 202). For many years to come lumber and fruit will com-

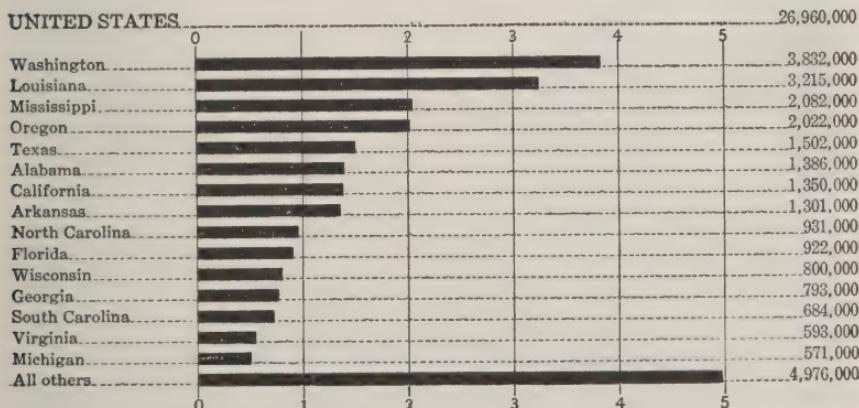


FIG. 202.—Production of lumber (1921), by states, in millions of M feet. (See Table VI, Appendix.)

pete for supremacy in the economy of the Pacific States. Both are responses to the wonderful climate, one direct and spontaneous, and the other through the exercise of expert human knowledge.

Climate and Scenery.—Not least among the natural resources of the Pacific States must be reckoned their climate and scenery

as they directly influence human life. Mountains, forests, deserts, and coast furnish some of the finest scenery in the world. Many forest-clad peaks of the Cascades loom up from sea level to perpetual snow in full view with large and clear outlines. The high Sierra, "with spreading ridge and foothill, rises like some huge, sprawling monster, its granite back unbroken for a thousand miles." Of the profound canyons of the western slope, those of the Yosemite (Fig. 203), Hetch Hetchy, and Kings River are among the grandest and most impressive in the world.



FIG. 203.—Yosemite valley, California. Bridal Veil fall on the right.

The frequent and extreme changes of weather characteristic of the Eastern States are generally absent. Uniformity is the rule and the weather is predictable for a long period in advance. The summer is an unbroken succession of sunny days. On account of the dryness of the air the heat is not oppressive and

a sea or mountain breeze brings cool nights. Even in winter houses are not needed primarily for shelter, and fires are not essential for comfort. The air is mild but stimulating and outdoor life is very attractive. The luxuriance of natural and irrigated vegetation is largely under human control. The conditions of life, especially in the coast lands of southern California, are among the most enjoyable in the world. No region deserves wider fame as a health and pleasure resort, and many visitors yield to the temptation to make there a permanent home.

Summary. — So much of the Pacific States is occupied by mountains, forests, and desert, that general agriculture cannot play a large part in their economy. The climate is very favorable for fruit growing. Other abundant resources are gold, petroleum, and timber. (See Fig. 204.)

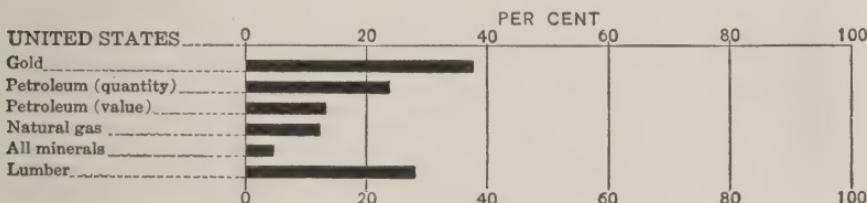


FIG. 204.—Rank of Pacific States in minerals and forest products (1920). (See Table IV, Appendix.)

QUESTIONS

1. What natural advantages for irrigation exist in the Pacific States?
2. How will the Panama Canal help the orange growers of California?
3. What has politics to do with fruit growing in California?
4. Why do some people refuse to raise wine grapes?
5. Were the Pacific coast Indians equal in ability to those east of the Rocky Mountains? What are the economic reasons for the difference?
6. What effect have the abundance and low cost of petroleum upon Pacific coast shipping and commerce?
7. In view of the scarcity and high price of lumber in the Central and Eastern States, is the exportation of it from the Pacific coast to foreign countries economically justifiable?

8. What are the advantages of government control of forests?
9. What geographical and economic reasons exist for the political separation of the Pacific States from the United States? for their union with the United States?
10. Which is of greatest permanent value to the Pacific States, mines, forests, climate, or coast line?

CHAPTER XXX

THE PACIFIC STATES: MANUFACTURES, COMMERCE, AND CITIES

Manufactures. — The comparative isolation of the Pacific States has fostered home industries. The lack of coal is compensated by water power everywhere present along the mountains and by the petroleum of the south. Manufacture is largely of domestic raw materials and there is little variety. Lumber is the most valuable product. About three fifths of the manufacturing is carried on in the six largest cities without much specialization. Meats, flour, foundry products, and printed matter are large items in all. Canned fruits (Fig. 205), sugar refined from native

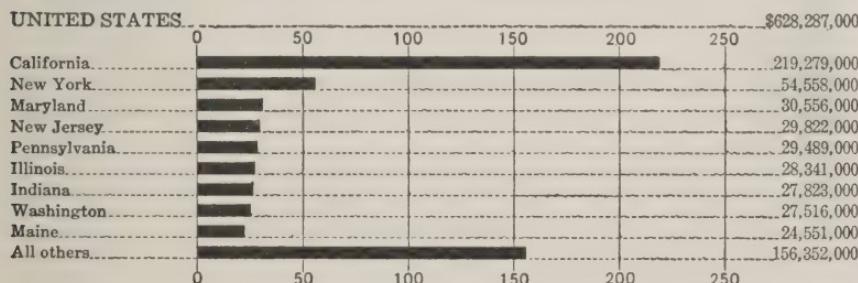


FIG. 205. — Rank of states (1919) in canning and preserving, in millions of dollars.

beets and from Hawaiian raw sugar, roasted and ground coffee, and refined petroleum belong especially to San Francisco and California. Textiles, knit and leather goods, and most articles of luxury and art are imported. The value of all manufactures is about 4 per cent of the total for the United States (Fig. 206).

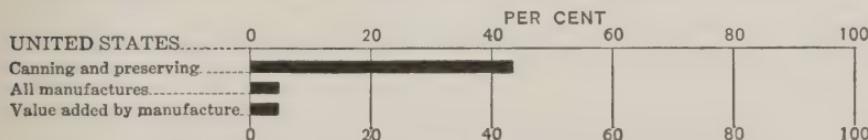


FIG. 206. — Rank of Pacific States in manufactures (1919). (See Table V, Appendix.)

Transportation. — Traffic north and south is carried on chiefly by sea. There is a continuous railroad line, mostly under Southern Pacific control, from San Diego to Vancouver. The transcontinental systems control land transportation. Two enter southern California (p. 335).

The Southern Pacific Railroad finds a gateway through the mountains by way of the Salton Sink and San Gorgonio pass to Los Angeles. The Santa Fe enters the southern end of the Great Valley through the Tehachapi pass. Both systems extend northward to San Francisco. The Union Pacific and Western Pacific systems cross the mountain wall through canyons to Sacramento. The water gap of the Columbia River admits the Union Pacific and Northern Pacific lines to Portland. The three northern Pacific systems (p. 335) cross the Cascades through tunnels directly to Puget Sound. The mountains and plateaus comprising three fourths of the area are generally without railroad facilities.

The Columbia River has a 25-foot channel from the sea to Portland and an 8-foot channel to the mouth of the Snake River. Puget Sound admits ocean vessels to the Intermont Valley of northern Washington, and with its numerous ports plays the part of a small inland sea. Commerce is concentrated at the three great inlets which have determined the location of all but one of the principal cities and railroad terminals.

Cities. — In the Pacific States there are 38 cities of more than 10,000 inhabitants, of which 5 have more than 200,000; all of which are great seaports. About 62 per cent of the total population is urban. This concentration is in part due to the use of irrigated land, which gives rise to small towns (p. 325), and in part to the sparse population of forests and pastures.

San Francisco (508,000). — The second city of the Pacific States and the leading seaport on the Pacific coast ranks twelfth among the cities of the United States. The metropolitan district (p. 165) contains about 800,000 people and ranks higher. San Francisco Bay, about 50 miles long and 10 miles wide, occupies a drowned valley between the Coast Ranges, and an arm 30 miles

long extends eastward into the Great Valley. There are nearly 500 square miles of open water, completely protected from the sea and deep enough to float the navies of the world. It is entered by the Golden Gate, a strait 5 miles long and 1 mile wide (Fig. 207). The city, located upon the site of an old Spanish post and mission, occupies the northern end of a hilly peninsula between the sea and the bay. It covers an area about 8 miles square and includes a range of rocky hills 300 to 900 feet high. The original surface has been smoothed by grading down the hills and filling the coves of the shore. The city faces the bay with the business district near the water front, the residence districts farther back on high ground, and the parks on the seaward side.

In April, 1906, fire following an earthquake shock destroyed the principal business quarter and many residences. About 28,000 buildings covering one sixth of the city area were left in ruins. They were rebuilt in four years at a cost of about \$150,000,000. The new city is built of steel and reenforced concrete (p. 143), of the most modern and substantial type of architecture.

Suburbs. — Golden Gate Park of 1000 acres, a military reservation of 1500 acres, and a seashore drive of 20 miles are included in the city. The principal naval station of the Pacific is at Mare Island at the northern end of the bay. On the eastern shore Oakland (216,000), the principal railroad terminal and an important seaport, and Berkeley (56,000), the seat of the State University, form a part of the metropolitan district. The climate is breezy and damp, with almost daily fogs in summer. Electric power and light are derived from a hydraulic plant in the Sierra, 140 miles distant. A water supply is planned to be drawn from the Hetch Hetchy valley.

Commerce. — Of the ten railroads which reach the bay, only one enters San Francisco, the others being connected by ferry



FIG. 207. — San Francisco and vicinity.

from Oakland. The commerce of the district is much the largest on the Pacific coast. Regular steamship lines are maintained to Mexico, Central and South America, Hawaii, the Philippines, Japan, China, New Zealand, and Australia, and ships are cleared to almost every part of the world. The domestic coastwise trade exceeds all the rest in tonnage.

Population. — San Francisco is a cosmopolitan city, one fourth of the people being foreign born. Of these, Italians, Germans, Irish, English, Chinese, and Japanese are most numerous.

Seattle (316,000). — The metropolis of Puget Sound (Fig. 208) is the vigorous rival of San Francisco in the commerce of the



FIG. 208. — Seattle and vicinity.

University and a military academy are in full view.

Hydroelectric power and coal are near at hand, and used in manufacture, especially of cedar shingles. Seattle is nearer to Asiatic ports than San Francisco, and its foreign connections are equally extensive. It almost monopolizes the trade with Alaska and the Yukon territory, which was the principal factor in its increase of nearly 200 per cent in population between 1900 and 1910.

Tacoma (97,000), on Commencement Bay, shares with Seattle the advantages of Puget Sound shipping, railroads, coal, hydroelectric power, timber, and grain. The city claims a proprietorship in Mt. Rainier or Tacoma, whose glacier-covered summit is conspicuous 50 miles away (Fig. 209).



FIG. 209.—Tacoma, Washington, and Mt. Rainier.

Portland (258,000), on the Willamette River, 12 miles from the Columbia, commands the only waterway and the easiest natural outlet from the Interior States to the sea. It stands at the intersection of the river route with north-south routes of the Intermont Valley. It has connection with all the transcontinental railway lines. Water and electric power are obtained from the mountains. It is the commercial center of the rich Willamette valley, the Oregon forests, and the Columbia fisheries, and as a seaport enjoys a share of the foreign commerce of the Pacific. (See Fig. 210.)

Spokane (104,000), is the commercial center of the so-called "Inland Empire," comprising eastern Washington and northern Idaho. Falls of 60 and 70 feet in the Spokane River and other water powers in the district run mills, factories, and mines in both states. It is a junction point for five transcontinental railroad systems.



FIG. 210.—Portland and vicinity.

Los Angeles (577,000). — The commercial center of the fruit district of southern California is within 20 miles of a good artificial harbor and is important as a seaport (Fig. 211). The site between the mountains and sea insures an equable climate. The difference in temperature between the

coldest month and the warmest is less than 20 degrees and frost has occurred but five times in 20 years. The residence districts are notable for the number and variety of tropical trees and shrubs. Eucalyptus, palms, pepper trees, rubber trees, bananas, yuccas, oranges, and a profusion of roses, heliotrope, lilies, geraniums, and other flowers flourish all the year around. The country inland for 50 miles is watered by thousands of artesian wells, and is the most productive tropical fruit region in the United States. An aqueduct 200 miles long brings from Owens River sufficient

water for a city of a million people. The aqueduct also supplies power for car lines, lighting, and factories, and any excess of water may be used for irrigation. A rich petroleum field has been developed within the city limits.

Easy passes through the mountains eastward made Los Angeles a point of prime importance on the routes of the Southern Pacific and Santa Fe railroads, and their rivalry stimulated the growth of the city. The high market value of fruit lands and city property has brought a population of unusual wealth, enterprise, and intelligence. This has had a marked effect upon the ma-

terial, social, and political conditions, which are in many respects superior to those of other American cities. Between 1900 and 1910, its population increased 211 per cent; and from 1910 to 1920, 80 per cent.



FIG. 211.—Los Angeles and vicinity.

Foreign Commerce.—The foreign commerce of the Pacific States amounts to 11 per cent of the total for the United States, over two fifths through Puget Sound and nearly two fifths through San Francisco. The shipping tonnage of the Sound ports is greater than that of all others, but the goods are of less value. The Panama Canal will stimulate the commercial

development of the Pacific ports to a degree difficult of estimation. The possibilities are very great. Half the people on the globe live around the Pacific and Indian oceans. If their economies ever become as complex (p. 92) as those of the people around the Atlantic, the value of their trade will not be inferior.



FIG. 212.—A steamer at Seattle, loading for Japan and China.

freely they would furnish an almost unlimited supply of cheap labor with a low standard of living. For this reason and because of their inability to assimilate with white Americans, further immigration is prohibited by law.

Summary.—Mountain and ocean barriers render access to the Pacific States difficult, and cause the concentration of urban population at a few seaports. The commerce of these ports is likely to be multiplied many times in the near future.

Economic Rank.—The lack of coal, on the Pacific coast, seems to forbid an industrial development comparable with that of the Atlantic coast. The mines in Alaska may in the future supply this deficiency, and petroleum and hydroelectric power may be better than coal. The mother lode will, sooner or later, be exhausted,

Population.—One half the people of the Pacific States are native white of native parents (Fig. 37). Nearly one fifth are foreign born, among whom about 160,000 Chinese and Japanese attract more attention than their numbers warrant. They are generally industrious, thrifty, and contented with a very modest living.

If permitted to immigrate

the forests, even if conserved, cannot support a dense population, and the small area of available land forbids extensive agriculture. The most permanent and available asset of the Pacific States is likely to be found in their rare climate, which permits intensive tropical horticulture, and attracts people who can choose a home for the joy of living in it. The region is fast becoming the garden and pleasure ground of America. Left to itself, partial aridity, isolation, and lack of fuel might keep it in the second class of complex societies (p. 92). A position in the commercial currents of the north temperate zone and organic connection with the United States have imposed upon it a development beyond that of other youthful regions, and made it a peculiar example of a complex economic society of the fourth class.

QUESTIONS

1. Why do the transcontinental railroad systems control the transportation and to some extent the politics of the Pacific States?
2. Compare the natural advantages for commerce of San Francisco Bay and those of Puget Sound.
3. Why is San Francisco nearly twice as large as Seattle?
4. Compare the natural economic advantages of New York and San Francisco.
5. Why is Seattle nearer to Asiatic ports than San Francisco is?
6. Account for the rapid growth and large population of Los Angeles.
7. Why is the commerce of the Pacific half of the world much smaller than that of the Atlantic half?
8. Of what advantage to the United States is the fact that its territory extends across the continent from the Atlantic to the Pacific?
9. If the territory of the United States extended from the Gulf of Mexico to the Arctic Ocean and was bounded on the west by the Rocky Mountains, would it be of more or less value than the present territory?

CHAPTER XXXI

THE OUTLYING TERRITORIES AND DEPENDENCIES OF THE UNITED STATES

THE outlying territories of the United States do not play a large part in their economy. Alaska is continental and polar and has few resources not already existing in the United States. The rest (except Panama) are far-away tropical islands which might be expected to supply those products for which the United States are poorly adapted. Yet they contribute less than the single neighboring, independent island of Cuba.

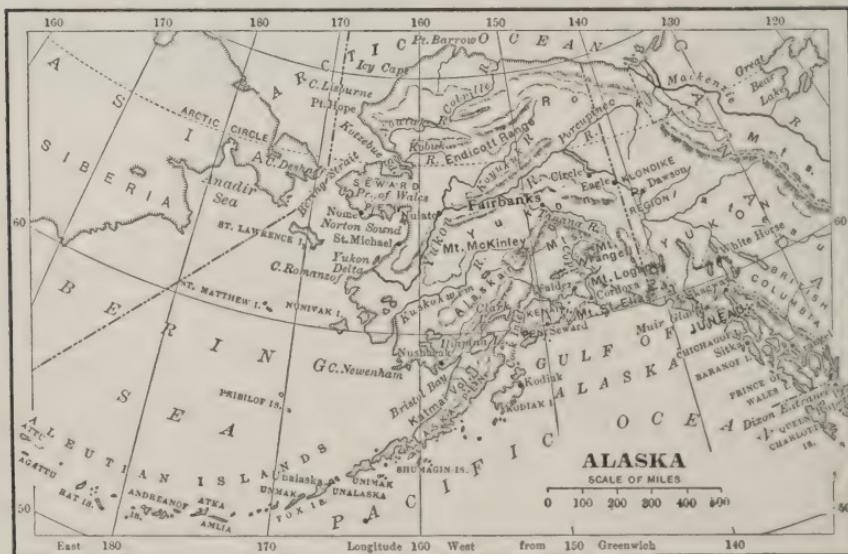


FIG. 213.—Alaska.

Alaska.—The territory of Alaska occupies the northwestern projection of North America with its peninsulas and islands and

a strip of coast stretching 500 miles to the south (Fig. 213). It extends through as many degrees of latitude and longitude as the whole of the United States and its area is nearly one fifth as large.



FIG. 214.—The coast of Alaska, near Sitka.

In relief it repeats the large features of the Interior and Pacific States. The Coast Ranges, 100 to 200 miles wide, extend in a great curve of 2500 miles along the Pacific coast and contain the highest peaks in North America. The interior is occupied by the Yukon Plateau which descends westward to low plains bordering upon Bering Sea. The northern part is crossed by the Rocky Mountains beyond which a hilly plateau slopes to the Arctic Ocean.

Coast Line.—The Pacific coast is extremely complex. A belt of high, rocky islands 100 miles wide, separated by a maze of deep "canals" and fiords lies between the mainland and the sea. (See Fig. 214.) The shores of Bering Sea and the Arctic Ocean are generally low and regular, and the coast waters are shallow.

Climate. — Alaska lies in the cold temperate and polar zones (p. 56), but extent in latitude and longitude, and extremes of relief and exposure give it a variety of climates. The Pacific coast is exposed to almost constant southwesterly winds from the ocean, which bring an equable climate similar to that of the northern Pacific States, but with longer and colder winters and a heavier rainfall. As the damp winds from the ocean are turned upward by the mountain wall, condensation is rapid, heavy rain falls on the lower slopes and still heavier snow on the higher. The peaks are covered with perpetual snow and the valleys are filled by the most extensive system of glaciers in the world, of which about 200 descend nearly or quite to the sea. In the interior the climate is extreme and severe, with short, hot summers, long, cold winters, and a rainfall of less than 20 inches.

Drainage. — The interior plateau is drained by the Yukon River and its tributaries, navigable in summer for 1500 miles but closed by ice 8 months in the year. The Kuskokwim is navigable 500 miles. The Pacific streams are glacier fed, short, and rapid.

Vegetation. — The Arctic slope is a treeless, mossy tundra (p. 56), the Yukon Plateau a grassy tundra with forest in the stream valleys. The Pacific coast region, where free from snow and ice, is covered with coniferous forest similar to that of the Puget Sound region (p. 345), but much inferior in density and value.

Minerals. — The mineral resources of Alaska are large but undeveloped except by gold mining. Many rich placer gold districts have been worked, of which Fairbanks in the interior and Nome on the Bering Sea coast are the most important. Quartz mining is carried on at Juneau, the present capital.

Alaska has sent out more than \$300,000,000 worth of gold, the present yield being about \$8,000,000 a year. Copper mines in the northern Coast Ranges have yielded \$127,000,000. The known fields of coal and lignite are extensive and probably

sufficient to supply the Pacific States, but the lands are under government control and at present coal is imported from British Columbia.

Fisheries. — The principal salmon fisheries (p. 78) of the world are located near the mouths of the Alaskan streams and yield about \$36,000,000 a year. The Pribilof Islands in Bering Sea are breeding and hunting grounds for the fur seal. The herd is now greatly reduced in numbers and without government protection would soon become extinct.

Agriculture and Herding. — The long days and nearly constant sunshine of the short summer are sufficient to ripen barley, oats, potatoes, and hardy vegetables in the interior valleys as far north as the arctic circle. The summer pastures are luxuriant, and hay enough can be cut to make cattle raising profitable. Domestic reindeer have been imported from Lapland, and under native care have multiplied rapidly. It is possible that the tundra may thus become an important source of meat for export.

Transportation. — The chief hindrance to the economic development of Alaska is the difficulty of transportation, which sometimes costs a dollar a pound for 100 miles. The Federal Government has built hundreds of miles of stage roads and established cable and telegraph lines to the principal centers. Nearly 500 miles of railroad have been built, but mostly in short, disconnected pieces. Two lines from the Pacific coast into the

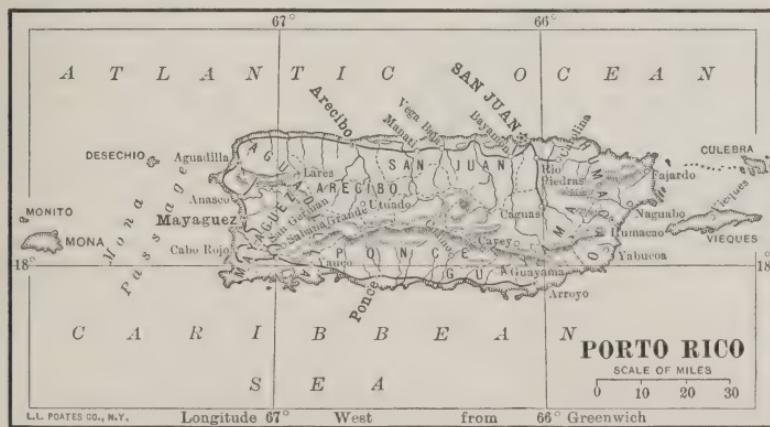


FIG. 215.—Porto Rico.

interior have been begun and one has been extended by the Federal Government 500 miles to Fairbanks. Alaskan ports are connected with Puget Sound by several lines of ocean steamers.

Population and Commerce. — The population of Alaska is 64,000, of which one half are Indians and Eskimos. The whites

are employed in mining and fishing. They export to the United States about \$54,000,000 worth of goods a year and import about \$37,000,000 worth. Only railroads are needed to increase these amounts indefinitely.

Porto Rico. — The easternmost of the Greater Antilles (Fig. 215) lies 1000 miles southeast of Florida. It is a compact island 35 by 95 miles in extent and traversed by several ranges about the height of the mountains of Pennsylvania. The climate is equable, healthful,

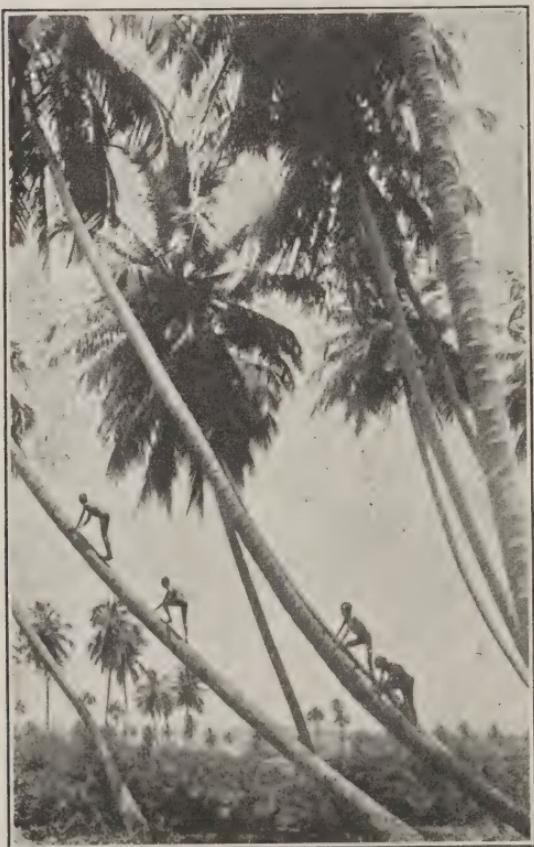


FIG. 216. — Climbing for coconuts, Porto Rico.

and delightful. The hills are cultivated to their summits, and all tropical products flourish (Fig. 216). Sugar, tobacco, coffee, and fruits are most abundant, of which about \$100,000,000 worth a year are exported to the United States. The largest

imports are rice and cotton cloth, which with other articles amount to about \$77,000,000 a year. The population of 1,300,000 is 72 per cent white of Spanish descent and 27 per cent negro. One fifth of the people are urban, and the capital, San Juan, on a fine harbor, is a well-built city of 70,000 inhabitants.

Hawaiian Islands. — A chain of eight large and many small volcanic islands in the Pacific Ocean in the latitude of Cuba, and about 2000 miles from San Francisco, constitutes a territory of the United States (Fig. 217). Hawaii, the largest, about the

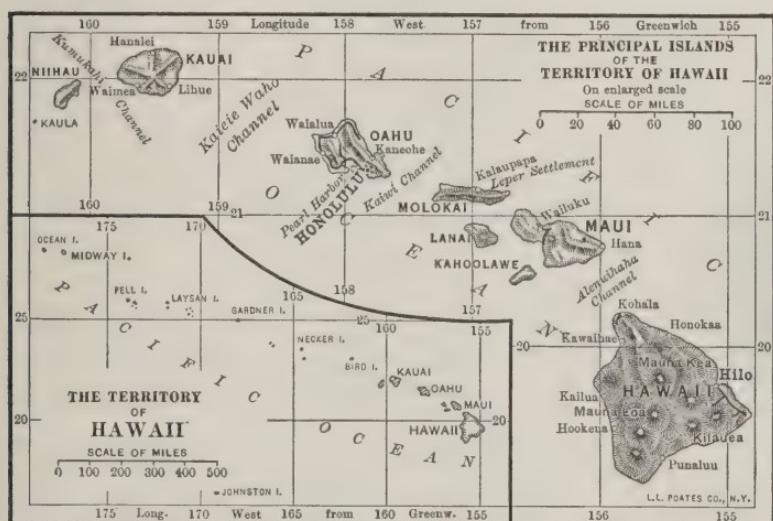


FIG. 217. — Hawaiian Islands.

size of Connecticut, rises in several rounded summits to 13,000 feet above the sea. Honolulu (83,000), the capital, on the island of Oahu, about 3500 miles from Japan, 5000 miles from China and the Philippines, and 4000 miles from New Zealand and Australia, has an excellent harbor and is the most important crossroads port of the Pacific. It is a coaling and supply station for seven trans-Pacific steamship lines and has cable communication with the United States and Asia. Latitude and marine location give these islands a climate and products similar to



those of Porto Rico. Sugar cane is the principal crop and the yield of sugar per acre the largest in the world. In 1923 the islands exported \$70,000,000 worth of sugar. Of the population (256,000), fewer than one fourth are white, one fifth are native Malay, and the rest are Japanese and Chinese.

The Philippine Islands.—The archipelago of the Philippines, lying about 6000 miles across the Pacific Ocean, and only about 600 miles from the coast of China, belongs to the United States (Figs. 218, 222). There are about 1700 islands extending north and south as far as from New Orleans to Duluth, but in the latitude of Central America. Luzon, the northernmost, and Mindanao, the southernmost, are each about as large as Ohio. They are generally mountainous and volcanic. The climate of the lowlands is always hot, damp, and trying for white people, especially women and children. The monsoon rains of summer are very heavy, and destructive hurricanes occur.

Where the tropical forest is cleared its place is taken by coarse grass. The bamboo grows to a height of 70 feet and is used for houses, bridges, and

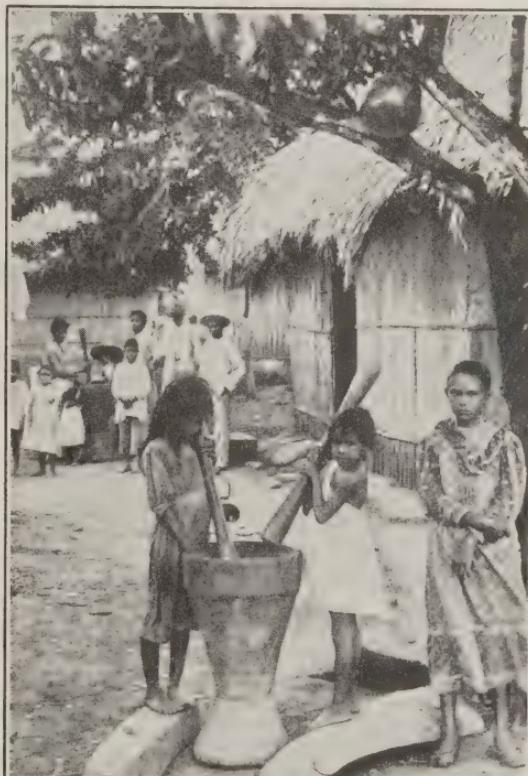


FIG. 219.—Natives pounding rice, Philippine Islands.

implements. All tropical plants flourish, among them the coconut, areca, and nipa palms, cacao, coffee, yam, sugar cane, and 50 species of edible fruit. Rice is the staple food (Fig. 219), but methods of cultivation are so crude that the crop is insufficient to supply the home demand. Cotton, tobacco, maize, and sweet potatoes are grown. The most valuable product for export is Manila hemp, a coarse fiber obtained from a plant of the banana family. There are about 120 miles of railway, but transportation is chiefly by water, on foot, or by carabao, a native species of water buffalo.

The population is 10,950,000, of which about 15,000 are white, mostly of Spanish blood. There are about 80 tribes of native Malay stock, differing in language, religion, and degree of civilization. Manila, the capital, is a commercial city of 283,000 inhabitants on a commodious bay. The islands send to the United States exports amounting to about \$77,000,000 a year, of which one fourth is hemp and one third sugar and tobacco. Imports from the United States amount to \$49,000,000 a year, one half of which is cotton cloth and machinery.

The Panama Canal Zone. — North and South America stretch 9000 miles across the parallels dividing the world into an Atlantic and a Pacific half. The continental barrier is broken almost in two in the middle by the Caribbean Sea, only the narrow isthmus of Panama being left between Atlantic and Pacific waters. The distance is less than 50 miles, and the highest point of the divide is only about 300 feet above the sea. For centuries men dreamed of cutting a passage through this comparatively slight obstruction. To accomplish it the control of malaria and yellow fever was as necessary as the removal of earth and rock. Up to the beginning of the twentieth century the sanitary and engineering difficulties of the work were such as to render it practically impossible. (See Fig. 220.) Ships could pass from one side to the other only by going around the southern end of South America or clear around the world the other way.

When in 1904 the United States undertook the construction of the Panama Canal, control was obtained from the Republic of Panama of a

zone 10 miles wide having the line of the canal along its center. The waterway now completed does not cut the isthmus down to sea level or permit the Atlantic and Pacific waters to mingle. It may be thought of as a bridge of water over the land, raised 85 feet above the sea. Half its



FIG. 220.—Panama Canal.

length is through an artificial lake made by an immense dam in the Chagres River. An inlet 7 miles long leads from the Caribbean Sea to the dam, where a flight of three locks lifts vessels to the level of Gatun Lake. The only actual cut made in the isthmus, 9 miles long and about 200 feet deep, leads from the lake to dams and locks on the Pacific slope, by which vessels are lowered to an inlet 8 miles long on that side. The depth of the channel varies from 40 to 85 feet and its width from 300 to 1000 feet. The size of the vessels which can pass through is limited by the dimensions of the locks. Each lock is a concrete chamber 1000 feet long and 110 feet wide, closed at the ends by steel gates or doors. A ship can pass through the locks in about 3 hours and from sea to sea in 12 hours. (See Fig. 221.)

The effects of the canal upon world commerce must be far-reaching. The distance from Atlantic ports of the United States and Canada to Pacific ports of America is shortened one half or more, and from European ports by some smaller proportion. The domestic trade between all ports of the United States must by law be carried on in American vessels, which are more costly



FIG. 221.—Gaillard cut, Panama Canal. Dredges removing earth from a slide.

to operate than foreign vessels. Therefore, the freight rates between San Francisco and European ports can be made as low as those between San Francisco and American ports. This would result in a considerable diversion of foreign commerce from the Atlantic to the Pacific states. The exchange of goods between the Atlantic and the Pacific states will be greatly increased and much of the through freight hitherto carried by transcontinental railroads will go by water. Water routes between Atlantic ports and Asiatic ports are shortened about 3000 miles. The expansion of Pacific coast trade and the improved accessibility of the Pacific States may encourage a considerable immigration from Europe. Those states may increase in population and wealth and San Francisco may occupy in relation to

them an economic position similar to that of New York in the Eastern States.

Summary. — Considering their present and future products, Alaska, Hawaii, and Porto Rico are the most valuable outlying possessions of the United States. In promoting the commerce of the whole country, the Panama Canal is destined to have an incalculable influence. The Philippines have proved to be a burden rather than a support. Measures are being taken to provide for their political independence.

QUESTIONS

1. Why has the Federal Government retained control of the Alaskan coal fields? Is this a good economic policy?
2. Why has the Federal Government undertaken the construction of railroads in Alaska?
3. What are the Greater Antilles? What is the political condition of each?
4. Which is of greater value to the United States, Hawaii or the Philippines? Why?
5. Compare the importance of the Panama Canal with that of the Suez Canal.

CHAPTER XXXII

FOREIGN COMMERCE OF THE UNITED STATES¹

Although the domestic commerce of the United States is estimated to be forty times as great as its foreign commerce, the latter amounts to about eight billion dollars a year.

Imports. — The people of the United States buy from foreign countries nearly four billion dollars' (\$3,791,938,000) worth of goods a year. The reasons for this large and varied purchase abroad may serve as a means for classifying the goods. (See Table IX, Appendix.)

1. *Products of tropical plants which cannot be largely produced in the United States for the lack of suitable climate.* Most of these are table luxuries which people could do without. The largest items are coffee, cane sugar, cacao (chocolate), fruits, nuts, olive oil, tea, and spices. Of constructive materials, rubber is by far the most needed and valuable. Among fibers, jute, sisal, and Manila hemp supply cordage and sacking. These constitute about 30 per cent of all imports.

2. *Minerals not found in the United States.* Among these tin is the most widely useful, precious stones are costly luxuries, sodium nitrate is invaluable as a fertilizer, and nickel and platinum are rare but useful metals. These minerals amount to about 5 per cent of the total imports.

3. *Articles which might be produced at home but on account of labor conditions can be had more cheaply abroad.* The one great item of this kind is raw silk. Burlaps, linen, and other textiles also belong to this class, which forms 13 per cent of imports.

4. *Articles produced at home in large quantities, but insufficient or lacking in some special quality.* The largest item of this class is hides and skins. Cotton, wool, tobacco, wood, paper, copper, iron, and steel are other

¹ This chapter is based on the statistics of the Department of Commerce for the year ending Dec. 31, 1923.

important additions to resources in which the United States is already rich. Such articles form 25 per cent of all imports.

5. *Articles which require special technical or artistic skill not yet developed in the United States.* Chemicals, drugs, and dyes head this list. Gloves and fine leather goods, silks, velvets, fine woolens, works of art, and books are largely or wholly products of skill or talent belonging to few peoples. These comprise about 9 per cent of all imports.

To render the United States all but self-sufficient and independent of foreign commerce, without lowering the standard of living, two things are needed: (1) an expansion of territory into the tropics, and (2) an increase of scientific, technical, and artistic skill among the people. For example, Cuba, Mexico, or Central America would be ample for the first. Under the pressure of necessity the second has been largely acquired in four years of war.

Exports. — The people of the United States sell to foreign countries more than four thousand million dollars' (\$4,168,000,000) worth of goods a year. The largest item is raw cotton, amounting to more than 19 per cent. Other large items are petroleum, breadstuffs, machinery, iron and steel, vehicles, cotton and leather goods, animal fats, tobacco, meats, and copper, amounting to one half. The remainder is made up of about 90 items of relatively small value. Exports represent a surplus not needed at home and may be classified according to economic origin. (See Table IX, Appendix.)

1. *Products of agriculture*, cotton, tobacco, grain, fruits, etc., amount to over one third.
2. *Collective products*, petroleum, coal, copper, timber, lumber, etc., make up one fourth.
3. *Manufactures of iron and steel*, including engines, cars, carriages, automobiles, agricultural, electrical, and other machinery constitute 12 per cent.
4. *Miscellaneous manufactures* amount to 10 per cent.
5. *Animal products* form about 10 per cent.

Imports and exports are classified by the Department of Commerce as follows:

YEAR 1923	IMPORTS	EXPORTS
Crude materials used in manufacture	36.64	29.38
Crude foodstuffs	9.57	6.29
Manufactured foodstuffs	13.96	14.26
Manufactures for further use in manufacture	18.97	13.78
Finished manufactures	20.31	36.13

Several things are notable. Although the United States is one of the great food-producing countries, it buys more food than it sells. Half the goods sold are manufactures. There is not a single item for which the world is dependent upon the United States alone. American cotton, grain, tobacco, petroleum, iron, machinery, and copper constitute a larger share of the world's supply than is the case with other commodities.

Foreign Countries. — The countries with which the United States trades may be placed in four classes, determined by the economic development of each, which depends largely upon position, climate, and mineral resources. (See Table X, Appendix.)

Class I. Western Europe. — To the first class belong those countries of western Europe which have attained the highest stage of economic development. They utilize practically all their domestic resources, buy largely of raw materials abroad, and manufacture a great variety of goods for export. They also act as collectors and distributors, importing all sorts of goods which they assort and reëxport without change, as wholesale dealers and middlemen do in every community. None of them are able to feed themselves fully, and some are dependent upon other countries for most of the food they consume. They are the industrial and merchant nations for which factories at home and markets abroad are essential to prosperity or even to existence. Nearly one half (40 per cent) the trade of the United States is carried on with them across the north Atlantic Ocean by the main sea route of the world.

The United Kingdom of Great Britain. — The established leadership of the United Kingdom in world commerce depends upon a combination of geographical and historical causes. No other country enjoys in equal degree advantages of position in relation to Europe and America, number and excellence of seaports, large coal resources, mild climate, and a dense population of skilled artisans. The extent and resources of the oversea dependencies of the British Empire and the number of vessels under the British flag give to the British Isles the command of vast resources and markets. More than one seventh (14.5 per cent) of the total foreign commerce of the United States is with the United Kingdom, which is our largest customer for cotton, meats, tobacco, wheat, flour, and petroleum, buying one fifth of all our exports. In return we import textiles, rubber, tin, wool, and other articles of manufacture and merchandise amounting to two fifths as much as we export.

Germany, the great industrial and commercial rival of the United Kingdom, is less favorably situated for commerce, but has greater and more varied resources of food and mineral wealth. Industry is so organized as to attain a very high degree of scientific efficiency and to make the most of the rather severe climate, moderately good soil, and well-distributed coal and ores. German industry and commerce were greatly disturbed and almost suspended during the World War (1914-1918). Since their reestablishment, Germany buys cotton, copper, tobacco, meats, and grain, and sells a large variety of manufactures.

France is highly favored by nature, having as good access to the sea as Great Britain and better climate and soil than Germany. In mineral wealth the country is deficient. Southern France is in the Mediterranean region and its products are subtropical. The French buy cotton and automobiles from the United States, and sell fruits, fine textiles, and works of art amounting to as much as the textiles. Their share of our total commerce is about 5 per cent.

The Netherlands and *Belgium*, small countries at the mouths of the Rhine, play a larger part in the world's commerce than their size alone would account for. Three of their seaports, Antwerp, Rotterdam, and Amsterdam, are among the largest in the world. The soil is intensively cultivated and the coal fields of Belgium make the country a hive of industry. The Dutch have very productive colonies in the East Indies, and the Belgians control the Congo basin in Africa. Thus they are able to sell to the United States African rubber and diamonds and Sumatra tobacco, buying copper, cotton, foodstuffs, and oils, all amounting to 11.5 per cent of the United States commerce.

Class II. — Some countries of the temperate zone exchange with the United States raw materials and manufactured goods of home production, but do not act as middlemen. They carry on one fourth of the total foreign commerce of the United States.

Canada is the nearest neighbor, next of kin, and in an economic sense a small copy of the United States. The railroad systems of the two countries connect at many points, both make free use of the Great Lakes and connecting canals and rivers, and exchange of goods goes on almost as freely as between the states. Canadian forests supply lumber, wood pulp, and paper, the steppe furnishes cattle and hides, the farms flaxseed, and the mines copper. Canada buys much more than she sells, largely coal, machinery, iron and steel, oils, and foodstuffs, the whole amounting to 13.5 per cent of our commerce.

Japan, on the opposite side of the world, sells to the United States raw silk, tea, straw hats, and other goods amounting to more than her purchases, chiefly of cotton, machinery, and chemicals.

Italy and *Spain* furnish peculiar Mediterranean products, such as raw silk, macaroni, cheese, olive oil, fruits, nuts, and cork in exchange for cotton, tobacco, and petroleum.

Class III. — Young or economically undeveloped countries of the temperate zone sell raw materials and buy mostly textiles and machinery. Trade with them amounts to only 12 per cent of the whole and could be indefinitely increased by better shipping facilities.

Chile and *Peru* sell copper and nitrate of soda, *Argentina* and *Russia* sell hides and wool. *Australia* sells wool and *China* sells tea, wool, and raw silk.

Class IV. Tropical Countries. — The fourth class contains a long list of countries which supply tropical products: coffee, cacao, rubber, fibers, cotton, fruits, nuts, cane sugar, palm oil, tobacco, spices, and among minerals tin and copper. With few exceptions they sell to the United States goods amounting to many times the value of what they buy. Commerce with these countries amounts to more than one fifth (22 per cent) of the total of the United States.

Of these countries the United States is most indebted to *Cuba*, an island only 100 miles off the Florida coast and our chief dependence for cane sugar and fine tobacco. *Mexico*, almost as closely connected on the south as Canada on the north, but foreign in race, language, and customs, is the only source of sisal fiber, and contributes also cattle, hides, rubber, copper, and coffee. In *Brazil*, the southern subtropical highlands supply two thirds of our coffee and the Amazon lowlands 3 per cent of our rubber (p. 32).

The Caribbean countries, *Colombia*, *Venezuela*, *Central America*, and the *West Indies* furnish coffee, tobacco, fruits, and nuts. Of the United States dependencies *Porto Rico* contributes sugar, tobacco, coffee, and fruits, *Hawaii* sugar, and the *Philippines* hemp, sugar, and tobacco. The *British East Indies* send us tea, jute, burlaps, tin, rubber, and skins. *Egypt* alone furnishes the finest grade of cotton.

Ports and Ships. — The foreign commerce of the United States is carried on chiefly by sea from the Atlantic, Gulf, and Pacific coasts, but also across the land borders with Canada and Mexico. (See Tables XII, XIII, Appendix.)

The Eastern States have 65 per cent of the total, 61 per cent by water and 4 per cent by land, and the exports exceeding the imports. The port of New York handles 42 per cent of the whole. Boston, Philadelphia, and Baltimore follow in rank, with a combined commerce of 11 per cent of the whole. The Southern States have 17 per cent of the total, almost entirely by sea, 13 per cent being through New Orleans and Galveston. The large shipments of cotton from southern ports make their exports four times as

valuable as their imports. The Pacific States have 10 per cent of the total commerce, a little less than half through Seattle. The commerce of the Middle West with Canada, carried on chiefly through the lake ports Detroit, Chicago, Cleveland, Duluth, and Milwaukee, amounts to about 7 per cent of the total. Even the Interior States have a little foreign commerce across the Mexican border. (See Table XII.)

Of the total foreign tonnage of all the ports of the United States, New York has 23 per cent, exceeding that of any other port in the world. New Orleans, Baltimore, Boston, and Galveston stand next in rank with a combined tonnage of 21 per cent. (See Table VII, Appendix.) About 46 per cent of the foreign commerce is carried in American vessels, 31 per cent in British, 5 per cent in Norwegian, and the rest in Dutch, Italian, and French vessels.

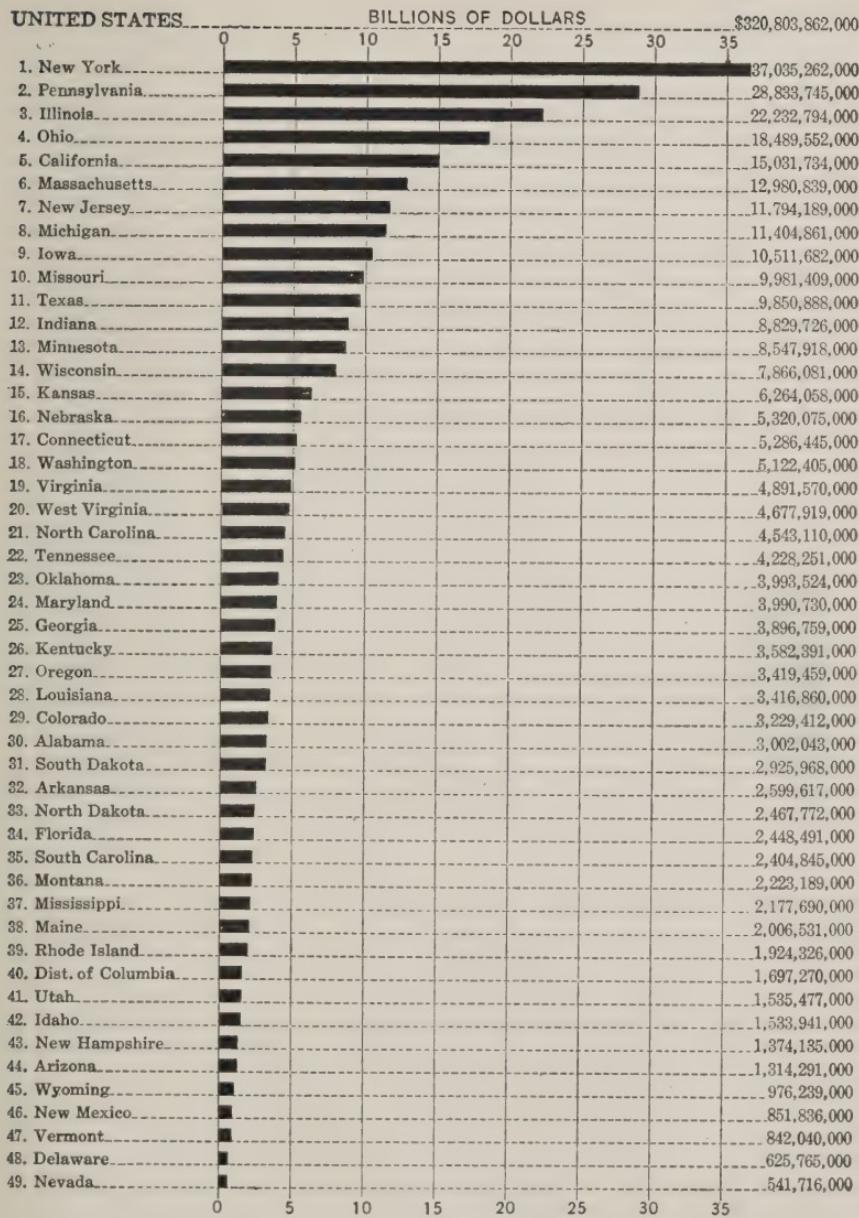
Summary. — Two thirds of the foreign commerce of the United States is carried on with western Europe, Canada, Japan, and China, countries in the north temperate zone. This includes some goods which came originally from the tropics.

QUESTIONS

1. What does the relative value of foodstuffs and of manufactures exported indicate as to the need for the improvement of agriculture in the United States?
2. Why does the United States import cotton, tobacco, and iron?
3. Is it of advantage to the United States to export goods of greater value than the imports?
4. Why is nearly half of our foreign commerce carried on with countries whose natural resources and economic products are similar to our own?
5. Why is the exchange of goods on east-west routes in the temperate zone more extensive than on north-south routes between different zones? What natural conditions make this possible?
6. In 1919-1920 the foreign commerce of the United States was more than three times as large as it was in 1913-1914. What caused this increase? Explain how the cause produced this result. Is our foreign commerce likely to increase or decline? Which would be more to our advantage?
7. In 1919-1920 four times as large a part of our foreign commerce was carried in American vessels as in 1913-1914. What caused this increase? What is the advantage to us in having a large merchant marine?
8. Using Fig. 222 as a basis, make a list of the natural features, position, relief, soil, mineral resources, and climate, which largely determine the wealth of each state. What are the chief sources of the wealth of each?

WEALTH OF THE UNITED STATES

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Includes \$6,085,032,000 not distributed by states.

FIG. 222. Rank of States in value of all property in 1922

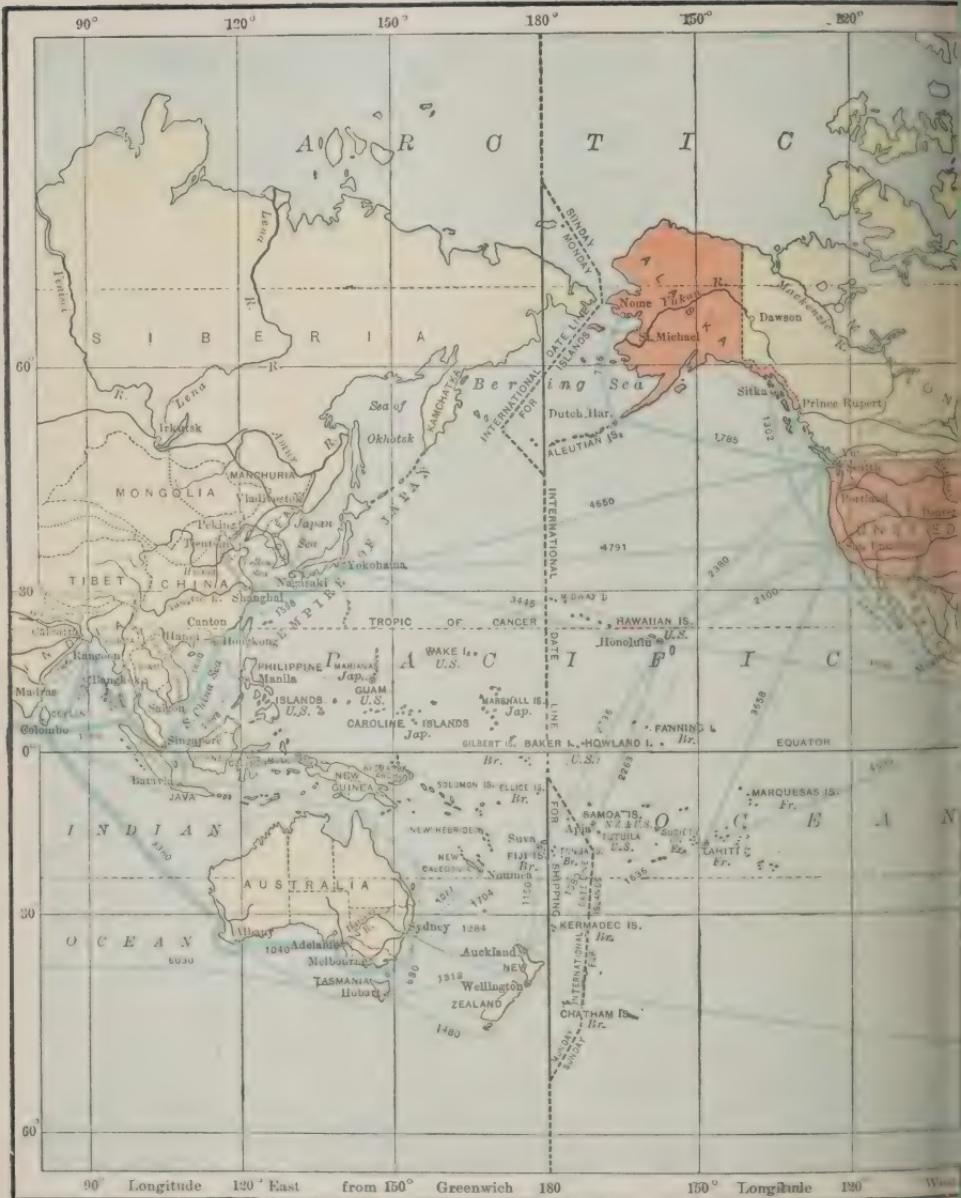
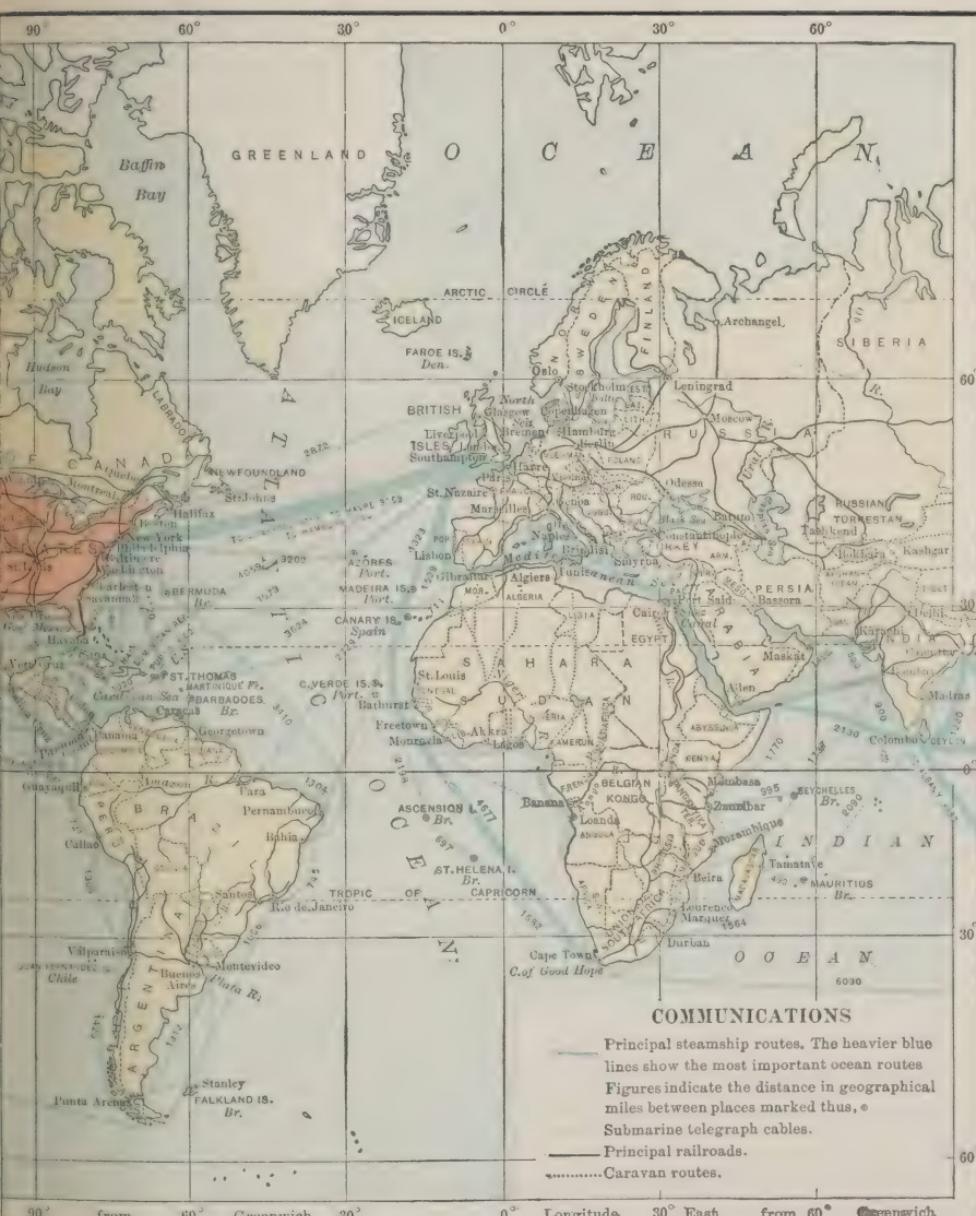


Fig. 222. Map of the World showing the United States and its outlying



COMMUNICATIONS

Principal steamship routes. The heavier blue lines show the most important ocean routes. Figures indicate the distance in geographical miles between places reached thus.

Miles between places marked
Submarine Telegraph cables.

Principal railroads

...Caravan routes.

CHAPTER XXXIII

THE ECONOMIC WORK OF THE GOVERNMENT

IN a civilized country the success of any economic undertaking depends not only upon the natural resources and conditions, but also upon the kind of government which prevails there. The Federal and state governments of the United States influence every industry and business in a thousand ways. Only their more important activities can be noticed in this book.

The Post Office Department. — The postmen are the only Federal officers who serve practically every man, woman, and child. There are few, if any, citizens to whom they do not deliver letters, papers, and parcels. The speed, safety, and small cost of mail service is one of the fundamental things which make economic prosperity possible. In some countries the telegraph and telephone systems are under government control and managed much like the postal service, but in the United States these are left to private enterprise.

The Treasury Department. — Civilized economy requires the use of money (p. 76) and the transaction of business depends upon the existence of a sufficient amount of currency, in coin and notes which do not fluctuate in value. This is provided by the Treasury, which coöperates with the banks to maintain a sound financial condition.

The War Department has charge of the improvement of rivers and harbors, upon which many millions are spent every year.

The Interior Department. — This department, besides having charge of the survey and sale of public lands, includes the *Geological Survey*, the work of which is fundamental to that in many other lines. The Survey is engaged in the making of topographic and geologic maps, in the exploration and description of the earth crust on the surface and underground, and in the investigation of mineral veins and deposits, including water resources. To it belongs also the work of the *Reclamation Service* designed to carry out large irrigation projects (p. 319).

The Department of Agriculture, created in 1889, has functions almost purely economic. It maintains the *Weather Bureau*, which issues daily maps and forecasts and, when necessary, warnings of storms, frosts, and cold waves. The *Bureau of Plant Industry* sends agents to every part of the world to find and bring home useful species and varieties. By its work and that of the *Bureau of Animal Industry* and the agricultural *Experiment Stations* in every state, the farmer gets the benefit of the latest scientific discoveries, and agricultural methods and results are being revolutionized. The *Bureau of Soils* makes surveys and publishes maps with statements of the crops best suited to each variety of soil. The national forests are under the care of the *Forest Service*.

The Department of Commerce publishes statistics of the commerce of the world (p. 382), and of the decennial census of the United States. It maintains the *Bureau of Fisheries* (p. 353), builds lighthouses, and conducts a *Coast Survey* for the improvement of navigation and the safety of mariners.

Summary. — Probably no government ever before did so much to develop the national resources of its domain and to help its citizens to get a better living, as the Government of the United States is doing to-day. Most of the states coöperate with the Federal Government, and also carry on independent work in geology, mining, agriculture, forestry, fisheries, water power, canals, flood control, sanitation, and other lines of economic importance.

QUESTIONS

1. How do the telegraph and telephone save time and expense?
2. What would be the advantages of government ownership of telegraph and telephone service?
3. If every bank were permitted to issue notes and coins, what would be the result?
4. How does the Weather Bureau help the farmer? the shipper by rail? the shipper by water?
5. What does the Government do to encourage foreign commerce?

STATISTICAL APPENDIX

Fuller statistics from which these tables are condensed may be found in the following works of reference, which should be in every school library. They may usually be obtained free of cost on application to the department or bureau of the Government which publishes them.

Reports of the Thirteenth and Fourteenth Censuses of the United States. Bureau of the Census.

Statistical Abstract of the United States (Annual). Department of Commerce.

Yearbook of the Department of Agriculture (Annual). Department of Agriculture.

The Mineral Resources of the United States (Annual). United States Geological Survey.

TABLE I.—STANDING OF THE UNITED STATES AND ITS ECONOMIC REGIONS

GENERAL ITEMS	YEAR	AUTHORITY	TOTAL FOR U.S.	PER CENT OF TOTAL FOR UNITED STATES					
				PER CENT OF WORLD TOTAL FOR U.S.	Mid. West	East. States	South. States	Int. States	Pac. States
Land area (square miles)	1920	Cens. Bur.	2,973,890	6.7	26.7	8.0	25.6	29.0	10.7
Population	1920	Cens. Bur.	105,710,620	6.8	34.5	33.6	23.5	3.1	5.3
Natural wealth (total value of agricultural, mineral, and forest products)	1919	Cens. Bur.	\$25,320,490,000		40.8	19.2	27.5	5.0	7.3
Gross wealth (agricultural, mineral, forest, and manufactured products)	1919	Cens. Bur.	\$87,740,049,000		38.3	38.8	14.5	2.5	5.7
Net wealth produced	1919	Cens. Bur.	\$35,360,669,000		38.0	34.8	18.3	3.1	6.3
Estimated value of all property ²	1922	Cens. Bur.	\$320,803,852,000 ³	35.0	40.5	37.5	13.5	3.8	7.5
Railway mileage	1921	Stat. Abs.	250,687	13.0	16.2	17.5	27.3	9.9	6.8
Foreign commerce	1923	Dept. of Com.	\$861,064		7.1	64.5	17.1		11.2
Imports	1923	Dept. of Com.	\$3,652,788		5.5	75.6	5.8		12.9
Shipping tonnage	1923	Ship. Board	120,622,810		9.0	50.0	20.0		21.0
Exports	1923	Dept. of Com.	\$4,208,788		8.5	55.0	27.0		9.7
Water power (potential) h. p.	1923	Geol. Surv.	55,000,000		6.0	17.6	9.1	28.0	38.4
Water power (in use) h. p.	1923	Geol. Surv.	9,000,000		14.3	36.1	16.9	9.7	23.2
Density, people per sq. m.	1920	Cens. Bur.	35.4		45.8	147.9	32.5	3.6	17.5
Estimated value per capita ⁴	1922	Cens. Bur.	\$3,034.73		3,250	3,318	1,714	3,659	4,234
\$5,085,532,000 undistributed									

¹²³⁴

TABLE II.—COLOR, NATIVITY, OCCUPATION, ETC., OF POPULATION

YEAR	AUTHORITY	TOTAL FOR U.S.	PER CENT OF EACH REGION					
			U.S.	Mid. West	East. States	South. States	Int. States	Pac. States
1920	Cens. Bur.	514,06,017	48.6	49.7	29.6	82.2	63.6	37.6
	Cens. Bur.	54,346,603	51.4	50.3	70.4	17.8	36.4	62.4
1920	Cens. Bur.	94,830,915	80.7	97.0	95.0	99.0	96.3	99.0
	Cens. Bur.	10,463,131	9.9	2.8	5.0	80.0	0.9	0.8
1920	Cens. Bur.	58,443,1957	55.3	58.4	46.6	63.4	63.0	51.8
	Cens. Bur.	13,712,754	13.0	12.7	19.9	2.2	14.0	20.0
1920	Cens. Bur.	41,014,248	39.0	38.3	41.5	37.5	37.6	44.9
	Cens. Bur.	10,953,158	28.3	26.5	9.9	32.4	34.0	20.7
1920	Cens. Bur.	1,090,223	2.6	2.4	1.5			
	Cens. Bur.	12,818,524	30.8	40.6*	41.1	16.5		
1920	Cens. Bur.	7,306,561	17.6	18.3	11.7	12.7	18.0	21.7
	Cens. Bur.	9,445,782	22.8	12.2	34.8	17.8	22.6	27.3

¹²³⁴

TABLE III.—AGRICULTURAL PRODUCTS

	YEAR	AUTHORITY	TOTAL FOR U. S.	PER CENT OF WORLD TOTAL PRODUCED BY U. S.				PER CENT OF TOTAL FOR U. S.			
				MID. WEST	EAST. STATES	SOUTH. STATES	INT. STATES	PAC. STATES			
Corn (bushels)	1922	Dept. of Agr.	2,890,712,000	72.2	71.2	7.7	19.6	1.1	0.3		
Wheat (bushels)	1922	Dept. of Agr.	856,621,000	28.5	67.1	7.1	6.5	11.4	7.9		
Oats (bushels)	1922	Dept. of Agr.	1,215,496,000	38.3	78.6	7.7	8.7	3.3	1.6		
Potatoes (bushels)	1922	Dept. of Agr.	451,185,000	12.7	46.0	81.5	6.2	10.7	5.5		
Hay (tons)	1922	Dept. of Agr.	112,791,000								
Barley (bushels)	1922	Dept. of Agr.	185,118,000	16.3	30.9	17.7	0.9	11.5	8.6		
Rye (bushels)	1922	Dept. of Agr.	95,497,000	11.9	67.4	2.8	2.3	5.6	21.9		
Rice (bushels)	1921	Dept. of Agr.	37,612,000	3.1	87.4	7.1	1.3	3.4	0.6		
Cotton (bales)	1921	Dept. of Agr.	9,964,000	66.1							
Tobacco (pounds)	1921	Dept. of Agr.	1,069,093,000	51.4	41.2	22.3	90.1	6.5	3.4		
Apples (bushels)	1922	Dept. of Agr.	203,628,000								
Peaches (bushels)	1922	Dept. of Agr.	50,795,000								
Grapes (car lots)	1922	Dept. of Agr.									
Citrus fruits (car lots)	1922	Dept. of Agr.									
Melons (car lots)	1922	Dept. of Agr.	72,538								
Horses (number)	1922	Dept. of Agr.	19,036,000								
Mules (number)	1922	Dept. of Agr.	5,467,000								
Milch cows (number)	1922	Dept. of Agr.	24,682,000								
Other cattle (number)	1922	Dept. of Agr.	41,550,000								
Sheep (number)	1923	Dept. of Agr.	37,209,000								
Swine (number)	1923	Dept. of Agr.	63,444,000								
Dairy products (value)	1919	14th Census	\$1,239,812,000								
Wool (pounds)	1921	Dept. of Agr.	2,235,546,000	7.5							
Wool and mohair (value)	1919	Dept. of Agr.	\$124,007,000								
Livestock on farms (value)	1919	14th Census	\$8,013,325,000								
Fowls and eggs (value)	1919	14th Census	\$1,047,323,000								
All crops (value)	1919	14th Census	\$1,455,355,000								
All animal products (value)	1919	14th Census	\$2,857,072,000								
All farm products (value)	1919	14th Census	\$17,422,437,000								
All farm property (value)	1920	14th Census	\$77,924,100,000								
Improved land in farms (acres)	1920	14th Census	503,073,000								
				54.3	10.2	24.7	6.0	4.7			

TABLE IV.—MINERALS AND LUMBER

	YEAR	AUTHORITY	TOTAL FOR U. S.	PER CENT OF TOTAL FOR U. S.			
				MID. WEST	EAST STATES	SOUTH. STATES	INT. STATES
Coal (tons)	1920	Geol. Surv.	657,811,000	33.5	55.5	4.8	5.4
Coal (value)	1920	Geol. Surv.	\$2,501,593,000	30.2	59.6	4.8	0.4
Petroleum (barrels)	1920	Geol. Surv.	442,929,000	15.0	53.4	4.3	0.5
Petroleum (barrels)	1923	Geol. Surv.	775,702,000	62.5	7.2	3.7	23.3
Petroleum (value)	1920	Geol. Surv.	\$1,360,745,000	70.5	18.2	4.0	36.3
Natural gas (M cubic feet)	1920	Nat. Gas Asc.	76,546,000	10.7	7.3	57.5	3.8
Natural gas (value)	1922	Nat. Gas Asc.	\$81,873,000	14.5	48.6	35.4	13.1
Iron ore (tons)	1920	Geol. Surv.	67,604,000	85.8	3.5	11.0	9.0
*Pig iron (tons)	1920	Geol. Surv.	35,710,000	60.1	41.7	7.1	1.0
*Steel (tons)	1920	Geol. Surv.	41,555,000	41.7	47.4	1.8	85.7
Copper (pounds)	1920	Geol. Surv.	1,299,051,000	60.0	13.5	1.4	37.5
Gold (value)	1920	Geol. Surv.	\$42,629,000	15.3	10.0	50.0	3.5
Silver (value)	1920	Geol. Surv.	\$59,874,000	35.4	1.3	1.1	93.7
Lead (tons)	1920	Geol. Surv.	513,533	44.1	36.7	13.1	50.0
Zinc (tons)	1920	Geol. Surv.	586,381	68.0	20.0	14.1	24.9
Stone (value)	1920	Geol. Surv.	\$133,542,000	27.0	62.0	11.6	2.3
Clay products (value)	1920	Geol. Surv.	\$373,770,000	47.0	38.3	8.3	4.0
Sand and gravel (value)	1920	Geol. Surv.	\$65,662,000	41.9	37.2	11.6	7.3
Cement (barrels)	1920	Geol. Surv.	100,023,000	38.2	34.1	4.1	9.3
Lumber (value)	1919	14th Census	\$2,065,728,000	20.1	22.9	33.4	2.2
Lumber (M feet)	1921	Dept. of Agr.	26,195,000	9.4	10.6	50.0	20.7
All minerals (value)	1920	Geol. Surv.	\$5,832,323,000	29.2	36.0	20.6	8.9

*Returns incomplete

STATISTICAL APPENDIX

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TABLE V.—MANUFACTURES

	YEAR	AUTHORITY	TOTAL FOR U. S.	PER CENT OF TOTAL FOR UNITED STATES				
				Mid. West	East States	South. States	Int. States	Pac. States
Cotton goods (value)	1919	14th Census	\$2,195,566,000	0.9	58.9	39.0		
Woolen goods (value)	1919	14th Census	1,234,657,000	1.7	92.0			
Hosiery and knit goods (value)	1919	14th Census	713,149,000	16.2	70.5	11.5		
Cordage, twine, etc. (value)	1919	14th Census	174,807,000		65.0			
Silk (value)	1919	14th Census	688,469,523		96.0			
Dyeing and finishing (value)	1919	14th Census	323,988,000		90.0			
Clothing (value)	1919	14th Census	2,371,529,000	21.4	75.7	1.4		1.3
Leather (value)	1919	14th Census	928,591,000	26.2	68.0	3.0		2.3
Boots and shoes (value)	1919	14th Census	1,155,021,000	25.3	72.8	0.1		0.3
Gloves and mittens (value)	1919	14th Census	46,940,000	39.4	58.6			4.8
Slaughtering and meat packing (value)	1919	14th Census	4,246,291,000	73.3				3.5
Flour and grist mill products (value)	1919	14th Census	2,052,434,000	62.1	16.2	9.5		9.0
Canning and preserving (value)	1919	14th Census	628,287,000	21.8	31.9	2.0		42.5
Butter, cheese and condensed milk (value)	1919	14th Census	1,066,125,000	45.0	40.0	2.0		3.0
Pig iron (value)	1919	14th Census	794,467,000	32.0	48.0	8.0		
Steel (value)	1919	14th Census	2,828,992,000	37.4	58.0	2.3		0.6
Brick, tile and terra cotta (value)	1919	14th Census	208,423,000	46.4	37.0	11.1		2.3
Pottery (value)	1919	14th Census	261,884,000	35.3	39.0	1.8		1.4
Paint and varnish (value)	1919	14th Census	340,346,000	40.0	44.0	0.4		3.4
Glass (value)	1919	14th Census	74,919,000	46.8	48.6			1.1
Cement (value)	1919	14th Census	175,265,000	34.9	36.4	2.7		8.2
Chemicals (value)	1919	14th Census	438,659,000	27.6	65.0	0.6		2.7
Fertilizers (value)	1919	14th Census	281,114,000	9.2	33.1	51.3		1.3
Agricultural implements (value)	1919	14th Census	304,901,000	84.1	9.4	2.2		3.4
Electrical machinery (value)	1919	14th Census	997,908,000	40.6	58.8			1.2
Shipbuilding (value)	1919	14th Census	1,022,361,000					
Carriages and wagons (value)	1919	14th Census	118,228,000	57.3	13.6	1.1		0.6
Automobiles (value)	1919	14th Census	3,080,073,000	82.6	13.5	0.2		1.4
Petroleum products (value)	1919	14th Census	1,632,533,000	12.0	28.0	29.0		13.0
Paper and wood pulp (value)	1919	14th Census	788,059,000	32.1	63.0			2.0
Printing and publishing (value)	1919	14th Census	1,699,799,000	35.5	59.8	0.5		5.2
All manufactures (value)	1919	14th Census	62,418,079,000	37.4	46.7	9.2		5.0
Value added by manufacture	1919	14th Census	25,041,699,000	34.7	50.1	8.7		1.2

STATISTICAL APPENDIX

TABLE VI.—AREAS, POPULATION, AND PRODUCTION OF UNITED STATES BY ECONOMIC REGIONS

	AREA 1920 1000 Sq. Mi.	POPULA- TION 1920 1000	WHEAT 1922 1000 BUSH.	CORN 1922 1000 BUSH.	OATS 1922 1000 BUSH.	POTA- TOES 1922 1000 BUSH.	HAY 1922 1000 TONS	MILCH COWS 1922 1000	OTHER CATTLE 1922 1000	HORSES 1922 1000	SHEEP 1922 1000	SWINE 1922 1000	LUMBER 1921 1000 M FEET	MIN- ERALS 1920 \$1000
United States	2,973.89	105,710.6	356,211	2,890,712	1,215,496	451,185	112,791	24,082	41,550	19,056	36,327	57,834	26,960	5,832,323
Ohio	40.74	5,759.3	35,634	149,997	39,744	11,214	4,895	1,048	832	787	1,957	2,862	133	354,257
Indiana	36.04	2,939.3	29,798	176,305	28,770	5,634	3,759	777	703	666	3,567	1,38	146,510	
Illinois	56.04	6,485.2	55,432	313,074	110,010	7,197	5,363	1,125	1,432	1,207	516	4,046	43	373,920
Michigan	57.48	3,668.4	14,326	60,716	49,434	37,812	4,530	967	576	594	1,115	1,051	571	166,339
Wisconsin	55.25	2,632.0	3,006	98,300	101,538	40,672	5,989	2,195	885	656	367	1,059	800	19,630
Minnesota	80.85	2,387.1	27,036	131,397	142,740	43,740	5,046	1,578	1,343	905	445	2,330	412	177,590
Iowa	55.58	2,494.9	16,867	45,535	222,811	8,400	5,242	1,175	3,134	1,395	775	8,218	5	57,255
Missouri	68.72	3,404.0	38,813	175,273	17,872	5,400	3,999	769	1,890	879	1,042	3,915	158	2,201
North Dakota	70.18	1,416.8	123,234	18,700	17,820	4,247	4,247	484	848	813	250	435	3,079	North Dakota
South Dakota	76.86	639.5	40,012	110,038	74,440	8,580	5,058	417	1,601	768	689	1,935	27	5,951
Nebraska	76.80	1,296.3	59,838	182,490	56,166	5,200	5,200	553	2,477	910	596	3,686	7,168	Nebraska
Kansas	81.77	1,769.2	122,883	28,386	4,160	4,513	709	2,282	1,019	2,282	1,019	2,275	13	193,694
Kentucky	40.18	2,410.6	7,475	88,000	4,282	4,720	1,497	520	511	374	631	1,214	256	195,546
Middle West	796.54	36,436.4	574,373	2,057,188	954,903	207,405	59,938	12,237	18,687	10,936	9,274	37,187	2,556	1,703,141
Maine	29.89	768.0	275	1,312	4,940	21,660	1,557	212	67	92	95	69	422	Maine
New Hampshire	9.03	443.0	1,032	3,444	1,032	1,400	597	121	41	36	20	30	262	New Hampshire
Vermont	9.12	3,554.1	189	3,444	3,132	3,000	1,287	367	84	76	48	53	139	15,009
Massachusetts	8.03	3,852.3	2,600	3,444	3,444	2,610	599	180	42	48	17	76	137	12,412
Rhode Island	1.06	604.3	506	340	31	270	55	26	6	3	12	5	5	Rhode Island
Connecticut	4.82	1,382.6	3,465	3,465	3,360	4,45	1,38	39	37	9	47	65	6,837	Connecticut
New York	47.65	10,385.2	9,014	28,349	31,770	37,400	6,897	1,095	4,02	520	512	520	284	78,079
New Jersey	7.51	3,155.9	1,540	69,912	66,232	16,435	516	1,511	31	72	1,02	24	72,335	New Jersey
Pennsylvania	44.83	8,720.0	25,444	41,242	28,512	4,916	1,971	491	496	468	1,743	368	1,302,352	Pennsylvania
Delaware	1.96	223.0	1,776	5,439	161	960	118	39	9	20	3	41	21	306
Maryland	9.94	1,449.0	9,537	25,400	1,740	5,151	662	192	137	89	385	71	31,156	Maryland

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D. of Columbia	437.5 ^{.06}	437.5 ^{.06}	10,375	53,312	3,320	16,585	1,234	426	438	300	322	754	593	370	D. of Columbia
Virginia	40.26	2,309.1	10,463.7	2,760	20,536	4,600	4,851	1,050	216	354	161	480	293	60,161	Virginia
West Virginia	24.02	1,463.7											467	511,813	West Virginia
Eastern States	238.22	35.545.1	60,900	224,553	94,500	142,134	19,933	4,834	2,103	2,007	2,076	3,455	2,858	2,100,830	Eastern States
ELE. ECON. GEOG.	24														
North Carolina	48.74	2,559.1	5,508	50,520	3,738	4,512	1,174	365	274	166	84	1,285	931	7,760	North Carolina
South Carolina	30.49	1,683.7	1,320	29,899	9,744	2,508	461	233	195	73	23	938	684	2,825	South Carolina
Georgia	58.72	2,895.8	1,520	52,620	8,532	1,700	687	509	686	99	70	2,131	793	12,179	Georgia
Florida	54.86	908.4	10,500	4,810	2,600	1,444	95	774	38	64	725	922	22,924	Florida	
Tennessee	41.68	2,337.8	4,484	7,544.0	4,351	1,923	495	597	315	340	1,546	452	55,023	Tennessee	
Alabama	51.27	2,348.1	218	50,932	5,540	3,840	782	500	515	130	83	1,387	1,386	6,290	Alabama
Mississippi	46.36	1,790.6	60	51,065	2,008	1,300	595	541	677	211	142	1,133	2,082	2,201	Mississippi
Arkansas	52.52	1,752.2	1,118	45,825	6,339	2,380	871	516	549	247	90	1,125	1,301	17,065	Arkansas
Louisiana	45.40	1,798.5	29,002	1,249	1,755	367	220	591	173	124	736	3,215	137,178	Louisiana	
Oklahoma	69.41	2,028.2	31,350	57,600	30,900	2,720	1,894	560	1,421	768	91	1,334	120	490,115	Oklahoma
Texas	262.39	4,663.2	9,992	114,580	33,405	2,448	1,295	1,073	5,363	971	3,077	2,475	1,502	369,709	Texas
Southern States	761.89	24,826.0	55,570	567,983	106,096	28,353	10,593	5,110	11,527	3,131	4,188	14,778	13,388	1,203,260	Southern States
ELE. ECON. GEOG.	24														
Montana	146.20	548.8	40,370	54,475	19,200	5,796	2,069	160	1,260	670	2,270	180	214	85,886	Montana
Idaho	83.35	431.8	24,275	1,976	6,115	15,910	2,730	153	521	281	2,492	196	543	32,440	Idaho
Wyoming	97.59	194.4	3,060	1,560	5,050	2,530	1,019	44	852	202	2,420	73	6	82,688	Wyoming
Colorado	103.65	939.6	21,776	18,320	4,623	18,400	2,709	243	1,301	421	2,054	453	41	76,038	Colorado
New Mexico	122.50	300.3	885	2,475	935	200	334	48	1,132	2,343	94	94	27,884	New Mexico	
Arizona	113.81	334.1	1,274	1,170	3,354	4,137	1,014	583	40	1,050	135	1,100	50	116,355	Arizona
Utah	82.18	449.3	5,682	781	112	920	975	19	340	433	128	2,250	48	76,530	Utah
Nevada	109.82	77.4	550	21						340	1,190	25	8	25,639	Nevada
Interior States	859.12	3,336.1	97,872	31,778	40,053	48,463	12,993	794	6,955	2,062	16,119	1,163	952	523,486	Interior States
ELE. ECON. GEOG.	24														
Washington	66.83	1,356.6	32,444	2,747	7,959	9,925	2,341	289	261	281	500	197	3,832	26,677	Washington
Oregon	95.60	783.3	19,744	2,277	2,158	5,145	1,075	216	620	1,860	272	2,022	1,350	5,496	Oregon
California	155.65	3,446.8	15,308	4,1176	5,250	10,200	5,235	632	1,380	367	2,310	834	1,350	269,444	California
Pacific States	318.09	5,566.8	67,496	9,200	19,884	24,830	9,734	1,137	2,261	920	4,670	1,251	7,204	301,597	Pacific States

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TABLE VII.—ECONOMIC STANDING OF CITIES OF THE UNITED STATES

NAME	POPULATION (Thousands) 1920		VALUE OF MANUFACTURES (Million Dollars) 1919		FOREIGN COMMERCE (Million Dollars) 1923	SHIP. TONNAGE (Millions) 1923	NAME	POPULATION (Thousands) 1920	VALUE OF MANUFACTURES (Million Dollars) 1923		FOREIGN COMMERCE (Million Dollars) 1923	SHIP TONNAGE (Millions) 1923	
	City	Met. Dist.	City	Met. Dist.			City	Met. Dist.	City	Met. Dist.			
Middle West													
Chicago	2,762	3,000	3,657	3,868	59.5	0.3	New Orleans	387	183	473.0	8.3		
Detroit	994	1,089	1,235	1,804	310.6	1.4	Atlanta	201	114				
Cleveland	797	881	1,092	1,100	54.9	1.4	Birmingham	179	114				
St. Louis	773	854	872	992	1.0	6.5	Memphis	162	118				
Milwaukee	457	471	576	613	53.4	1.5	San Antonio	161	146				
Cincinnati	497	488	500	500	64.1	6.0	Dallas	159	112	40.5			
Minneapolis	381	615	491	150	150	6.0	Houston	138	94		0.9		
St. Paul	235	426	193	662	399	1.9	Nashville	118	87				
Kansas City	324	243	294	205	218	1.1	Forth Worth	106	71				
Indianapolis	314	237	184	205	218	0.9	Jacksonville	91	38				
Toledo	243	268	205	559	119	1.1	Savannah	83	31				
Columbus	235	208	208	119	241	279	El Paso	78	18				
Louisville	235	139	190	190	53.0	1.1	Charleston	68	17				
Akron	208	139	190	190	53.0	1.1	Mobile	61	19				
Duluth-Superior	139	132	190	190	53.0	1.1	Tampa	52	27				
Youngstown	132	190	190	190	53.0	1.1	Winston-Salem	48	42				
Eastern States													
New York	5,620	7,750	5,261	7,439	3,316.8	27.6	Galveston	44	15	53.5	2.9		
Philadelphia	1,824	2,153	1,996	2,215	325.2	7.9	Wilmington	33	11				
Boston	748	1,744	619	914	359.3	3.6	Port Arthur	22	22				
Baltimore	734	678	678	106	185.2	8.3	Interior States	125					
Pittsburgh	588	713	615	816	10.6	Denver	256						
Washington	507	601	634	765	249.1	3.3	Pueblo	46	33				
Rochester	438	351	69	351	16.6	8.3	Salt Lake City	118	14				
Providence	296	463	268	328	33.4	0.7	Pacific States	577					
Norfolk	238	178	29	31	228.0	2.1	Los Angeles	641	278				
Bridgeport	116	144	144	208	704.7	1.0	San Francisco	507	417				
Portland, Me.	69	69	69	29	43.7	1.0	Seattle	316	779				
							Portland, Or.	258	274				
							Spokane	104	196				
							Tacoma	84	103				

TABLE VIII.—INTERNATIONAL TRADE IN WHEAT, 1921

COUNTRY	CROP (Million Bushels)		IMPORTS (Million Bushels)		COUNTRY		CROP (Million Bushels)		EXPORTS (Million Bushels)		IMPORTS (Million Bushels)	
	EXPORTS (Million Bushels)	CROP (Million Bushels)										
United States	794	356	28	8	Greece	10	10	49	4	116	4	13
British India	250	16	8	40	Russia (Asiatic)	;	;	77	4	;	;	;
France	323	2	40	18	Roumania	;	;	146	185	;	;	;
Austria	6	180	18	18	Australia	;	;	74	1	;	;	;
Canada	301	62	103	103	United Kingdom	;	;	32	1	;	;	;
Argentina	170	194	18	18	Bulgaria	;	;	14	4	;	;	;
Italy	108	194	18	18	Belgium	;	;	9	4	;	;	;
Germany	145	23	2	2	Netherlands	;	;	4	24	;	;	;
Spain	;	;	;	;	Switzerland	;	;	4	15	;	;	;
Chile	;	;	;	;	Brazil	;	;	4	27	;	;	;
					Japan	;	;	38				

TABLE IX.—FOREIGN COMMERCE OF THE UNITED STATES FOR THE YEAR ENDING DECEMBER 31, 1921

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TABLE X.—FOREIGN COMMERCE OF THE UNITED STATES, BY COUNTRIES FOR THE YEAR ENDING DECEMBER 31, 1923

	IMPORTS FROM (Million Dollars)	EXPORTS TO (Million Dollars)		IMPORTS FROM (Million Dollars)	EXPORTS TO (Million Dollars)
United Kingdom	344.5	821.4	Argentina	115.2	112.7
France	149.6	272.1	Brazil	143.2	45.5
Italy	92.3	167.5	Chile	92.2	31.0
Netherlands	79.5	109.1	Colombia	45.7	22.2
Germany	67.9	100.7	Uruguay	21.8	15.0
Spain	161.3	316.8	Peru	23.8	19.7
Sweden	31.4	61.8	Total South America	446.8	269.3
Denmark	36.1	112.4	Japan	346.9	264.1
Norway	6.6	38.7	British East Indies	309.8	39.5
Switzerland	20.0	27.6	China and Hongkong	207.4	126.1
Poland and Danzig	37.9	5.9	Dutch East Indies	54.8	12.0
Total Europe	1157.3	12.1	Total Asia	1019.7	511.3
Canada	415.9	651.9	Australia and New Zealand	54.6	144.8
Cuba	376.4	192.4	Philippine Islands	77.6	49.2
Mexico	139.8	120.6	Total Oceania	59.2	146.5
Other West Indies	29.3	50.8	Egypt	38.8	6.1
Central America	37.8	56.1	British Africa	32.4	37.9
Total North America	1010.8	1086.6	Total Africa	87.0	60.6

TABLE XI.—COMMERCE OF UNITED STATES WITH ITS DEPENDENCIES, 1923

	IMPORTS FROM (Million Dollars)	EXPORTS TO (Million Dollars)		IMPORTS FROM (Million Dollars)	EXPORTS TO (Million Dollars)
Hawaii	101.0	66.4	Philippines	77.6	49.2
Porto Rico	80.3	76.9	Alaska	53.7	30.6

TABLE XII.—COMMERCE OF THE UNITED STATES BY CUSTOMS DISTRICTS, 1923

	IMPORTS (Million Dollars)	EXPORTS (Million Dollars)	IMPORTS (Million Dollars)	EXPORTS (Million Dollars)
Atlantic Coast	2534.3	2070.2	Pacific Coast	480.7
Gulf Coast	237.5	991.8	Northern Border	486.8
Mexican Border	20.1	60.0	Interior	32.2

TABLE XIII.—TONNAGE OF VESSELS IN FOREIGN TRADE OF UNITED STATES, 1922

	ENTERED (Million Tons)	CLEARED (Million Tons)	ENTERED (Million Tons)	CLEARED (Million Tons)
Atlantic Coast	31.5	30.6	Pacific Coast	8.1
Gulf Coast	11.9	12.6	Lake Ports	13.4

TABLE XIV.—RANK OF LEADING COUNTRIES OF THE WORLD

(Including their colonies and dependencies)

	In Area	Square Miles	In Population	In Foreign Commerce
1 British Empire		13,257,000	1 British Empire	\$13,062,291,000
2 Russian Republic		8,269,000	2 Chinese Republic	7,801,000,000
3 French Republic		5,331,000	3 Russian Republic	135,066,000
4 Chinese Republic		3,913,000	4 United States	117,860,000
5 United States		3,805,000	5 French Republic	92,792,000
6 Brazil		3,281,000	6 Japanese Empire	77,000,000
7 Argentina		1,153,000	7 Germany	60,899,000
The World, Land area		57,156,000	The World	1,829,897,000
	In Railroad Mileage			
1 United States	250,687			
2 British Empire	139,335			
3 Russian Republic	43,490			
4 French Republic	40,977			
5 Germany	37,627			
6 Argentina	22,587			
7 Brazil	18,662			
The World	710,630			

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